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Volume 54 Number 8

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Clinical Aspects of Canine Nutrition

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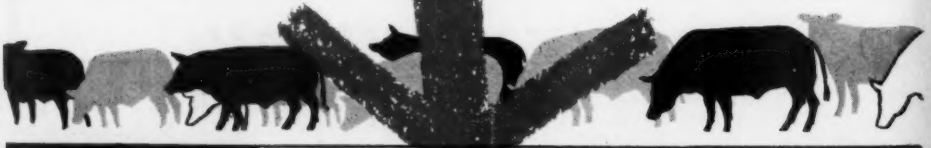

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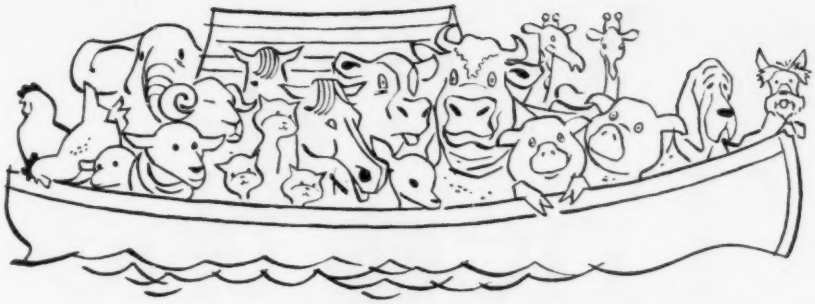

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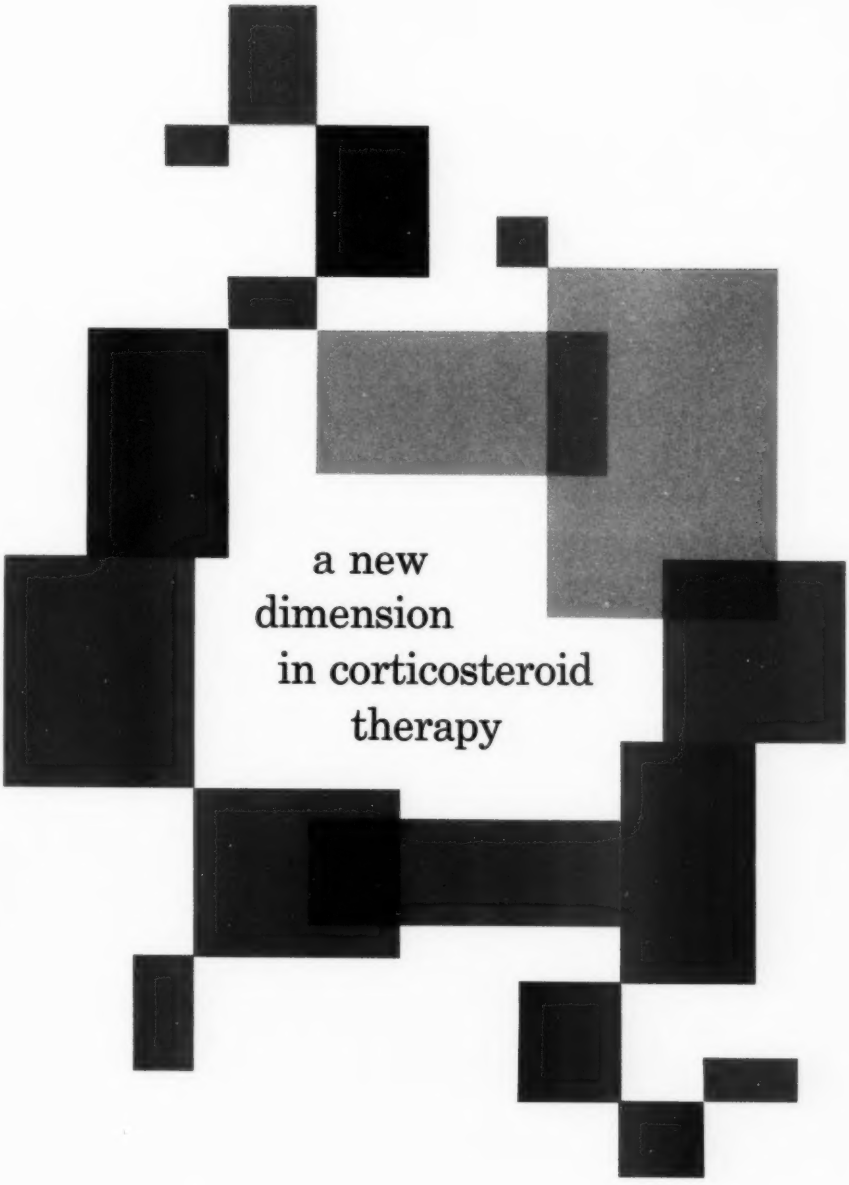
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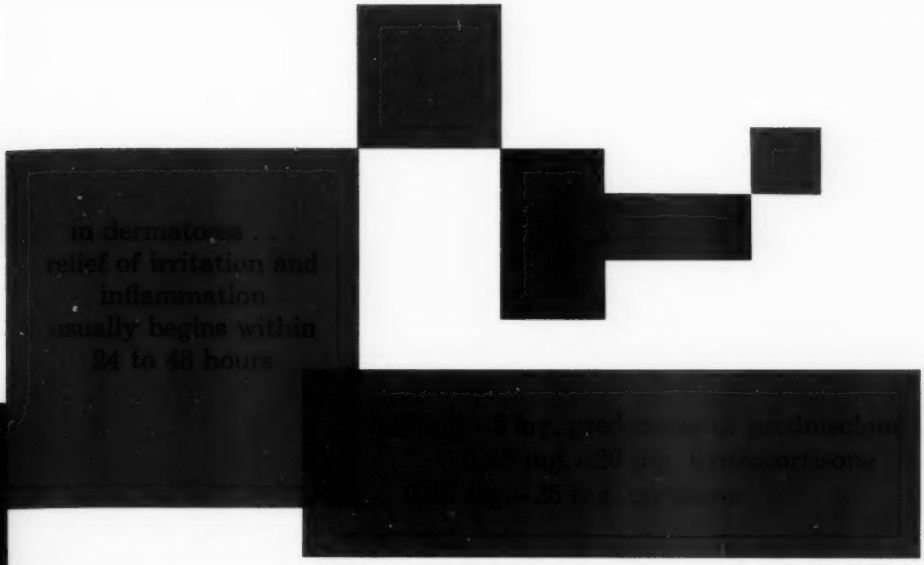

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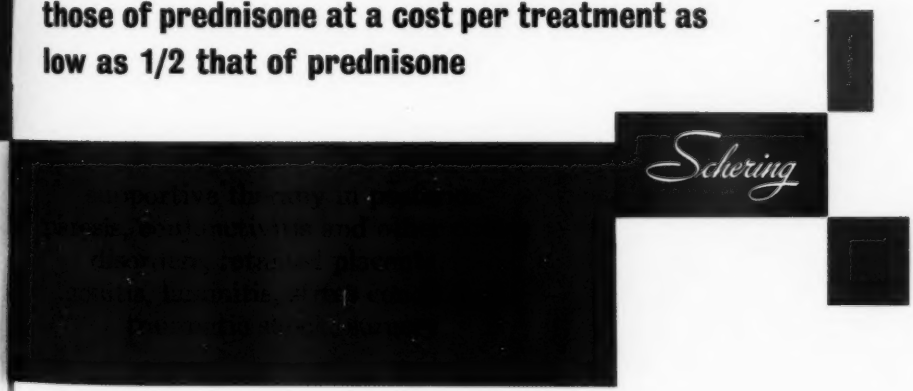

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arthritic conditions	6	4	1	11
supportive therapy	82	6	0	88
SMALL ANIMALS				
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arthritic conditions	14	1	1	16
supportive therapy	15	0	5	20
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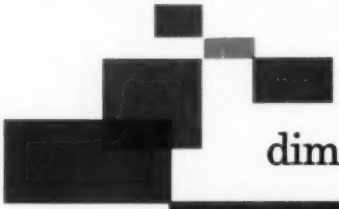

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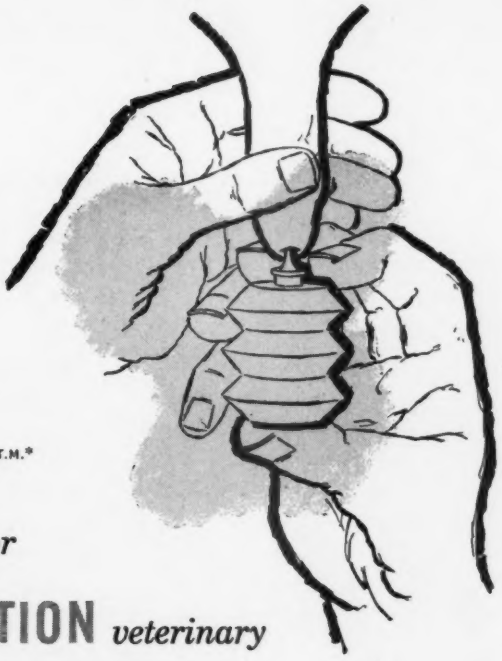

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1. Mires, M. H., and Chadwick, R. H.: Vet. News **10**:3 (Jan.-Feb.) 1947. 2. Mires, M. H.: J. Am. Vet. M. Ass. **117**:49 (July) 1950.

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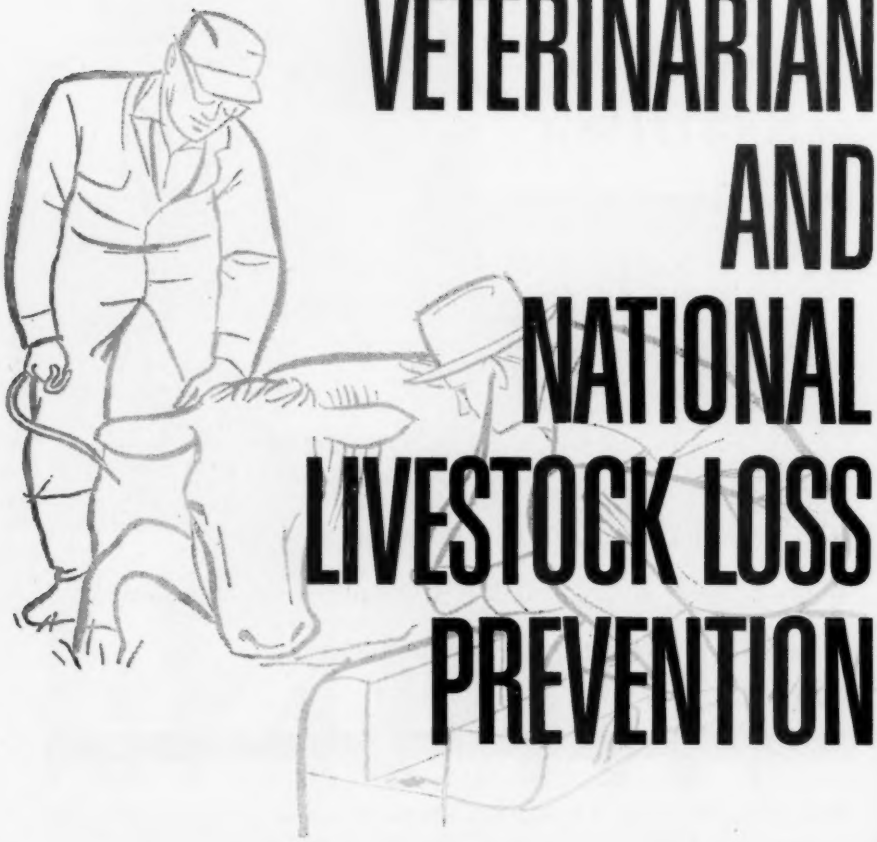

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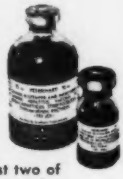

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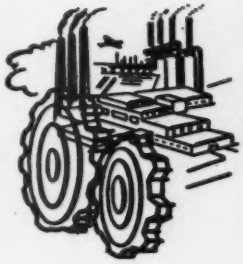

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News Comment

College Costs

The cost of sending a son or daughter to college ranges from $1,600 to $3,500 for the first year. Basic expenses include tuition, fees, board, room, books, supplies; miscellaneous expenses take in transportation, laundry, entertainment. Details are available in a booklet, College Costs, which may be ordered from BOCES, Educational Services Center, 546 N. Bedford Road, Bedford Hills, New York. New York. Cost is 25 cents.

Beef-Feeding Additive

A new chemical compound having no female activity, diallylhexestrol, showed promise in preliminary Washington State College reports. The compound not only increased gains, but also raised carcass grade and improved marbling. In checking fat in the 9th, 10th and 11th rib sections of steers in one test, researchers found controls to have 26.18% fat, steers that got 25 mg. diallylhexestrol daily had 33.34% fat, and the group receiving 50 mg., 33.5%.

Conference on Zoonosis

The second annual Midwestern Interprofessional Conference on Diseases of Animals Transmissible to Man will be jointly sponsored by the College of Medicine, The State University of Iowa, and the Iowa State Department of Health at Iowa City on September 10 and 11, 1959. The subjects to be covered will include brucellosis, rabies, leptospirosis, Q fever, staphylococcal diseases and others. Presentations will be made by veterinarians and physicians and will emphasize the public health practical aspects, and recent advances in these fields.

The conference will be held on a continuing annual basis, sponsored in rotation by the academic institutes of the several midwestern states.

Bull Test Station

A $45,000 appropriation has been landed by Missouri cattlemen to build a unit for beef cattle testing. The operation will handle 100 cattle at a time. In addition to gain and feed efficiency tests, the Missouri station will test carcass quality, conformation score, and weight for age. Breeders will shoulder the cost for operating the station. Charges are expected to be between $75 and $100 a head.

F.D.A. Bans New Uses of Additives

Lack of uniformity of conclusions among eminent scientists regarding the carcinogenous implications of the use of estrogenic and arsenical substances in feed or drinking water for animals has prompted an F.D.A. ban on future clearance for these products. The Delaney amendment to the food additive law is clear and conclusive that if it can be demonstrated that ingestion of these materials can induce cancer in test animals, the agency must forbid use, even though there may be no residual trace in end products.

Save Now Pay Later

Taxes on dividends accruing to planned savings accounts may now be deferred until the year the account matures or is closed, according to a Medical News report. Internal Revenue still holds that interest on regular accounts is taxable in the year earned because it has been constructively received. However, in the instance of savings and loan associations plans that pay extra dividends for systematic savings, neither regular interest nor bonuses are considered constructively received until the end of the planned savings period.

Dentures for Cows

Slip-over caps crimped around each worn-down tooth now serve as dentures for cattle owned by Colorado rancher, Rood Menter. The teeth were developed by Menter and Dr. Ward C. Newcomb, a Chappell, Nebraska dentist. Preliminary reports indicate that it takes less than ten minutes to fit a cow with eight caps. The process has been patented and crowns are now being made by Bovine Crowns, Inc., Chappell, Nebraska.

Convention Issue

A special convention issue will be mailed to the entire profession by the editors of VETERINARY MEDICINE shortly before the Kansas City meeting. Featured will be the highlights of convention town as well as items of interest to those who cannot attend the annual A.V.M.A. meeting.

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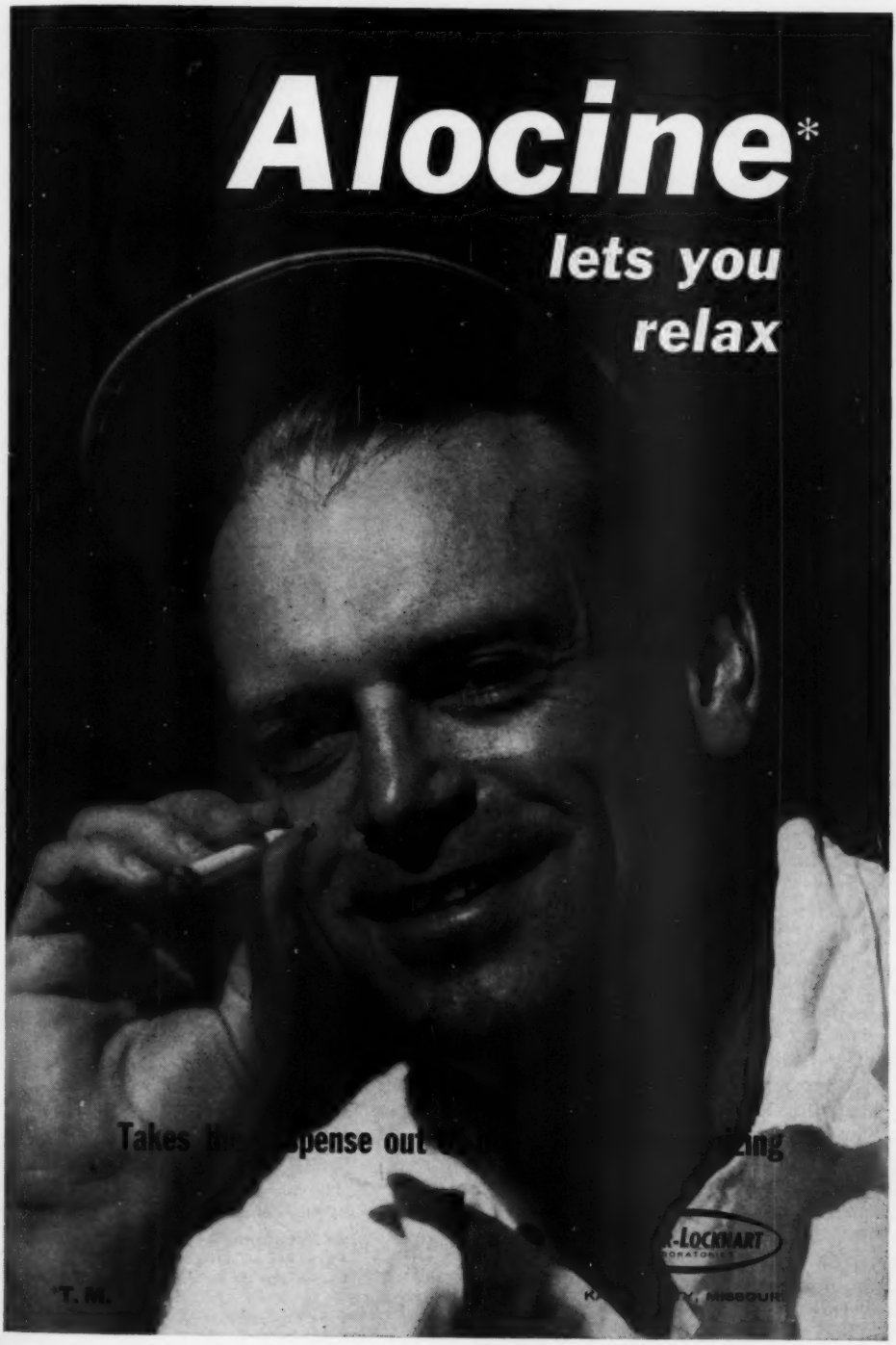
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BOVINE INFERTILITY

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Dairy cattle in Wisconsin.

E. A. WOELFFER, D.V.M.
Oconomowoc, Wisconsin

INFERTILITY, like mastitis, is largely a herd problem. It fits well into the realm of preventive medicine, and is a practice opportunity that has not been developed to its fullest extent. Veterinarians must point out to the livestock industry the importance of routine pregnancy determinations, the value of diagnosis and treatment in hard breeding individuals and problem herds, and the significance of veterinary supervision of breeding operations.

Practitioners who are interested in this phase of veterinary medicine, but feel a lack of experience, should avail themselves of every opportunity to make examinations of the reproductive tract in the course of making diagnoses for other ailments. They should make every effort to attend meetings and short courses on the subject, and learn to inseminate cows artificially. Approximately six million cows are now being artificially inseminated annually with semen from bulls in about 75 bull studs. Veterinarians were the logical choice when this method of breeding cows first came into being. Due to shortages of veterinarians and probably some disinterest on the part

of individuals, this service was lost by default. Most insemination is now being carried out by trained laymen, generally in a creditable manner. The question that now presents itself is simply this: do we have a responsibility to our clients and the livestock industry as a whole to exhibit a greater interest in this field? In our deliberations let us not overlook this fact: breeding or inseminating cows is an act of procedure which involves tissue—delicate tissue—that is or may readily become injured, infected, diseased or abnormal. Are we really justified in passing all of the responsibility to less qualified individuals?

Problem herds and problem individuals are not uncommon. Problem herds as well as healthy ones need supervision and guidance. Breeders and operators of bull studs continually seek the assistance and cooperation of veterinarians. The demand for veterinary services will increase as more practitioners become qualified or available for the work.

Examinations

In the matter of examining the individual cow or heifer, it is always helpful to obtain reproductive information of an individual along with the general breeding history of the herd. It is helpful to know how many times the animal was serviced and when last bred, etc. If history is not available, relative accuracy in appraising the condition and activity of the reproductive tract can still be attained.

It is advisable that we make a rapid, automatic survey of the general health and condition of the animal as we approach the cow. This preliminary observation can be made in a matter of seconds. It frequently mirrors the condition that exists within the cow. Special note of the external pelvic region and the vulva should be made.

A swollen, slightly reddened vulva may indicate infection or injury. It may also denote estrus or cystic activity, intermittent prolapse of the vagina, impending abortion or the more obvious symptoms of approaching normal calving.

A vulva that is tipped anteriorly and particularly one in which the lips remain partly separated, more readily permits infected material to gain entrance to the vagina. This produces irritation and inflammation. As a consequence, a cow with a patent vulva will often balloon the vagina. Such an individual is often difficult to settle if proper treatment and surgical correction are not made.

If there is an abnormal discharge of the vulva, it should be noted. A cloudy discharge at the time of estrus may indicate mild infection of the uterus, cervix or vagina. The condition may be responsible for the low conception rate of the animal. Attempts to determine the source of the infection should be made.

Check for Pregnancy

The first step in examination of an individual animal is to palpate for pregnancy. This is extremely important. Regardless of available reports or records, the state and

GESTATION CHART

Length of Gestation	Shape Amnionic Vesicle (fetus)	Size	Fluid (volume)	Diameter Uterine Artery
30-35 days	Like pea (round—firm) slippery feel	3/8"-7/8"	65-70 cc	
50 days	Oblong—soft (like buttermat)	2"	200 cc	
90-100 days	Fetus	4"-7" (small rat)	1 quart	
5 months (150 days)	Fetus difficult to palpate	12"-16" (large cat)	7 quarts	3/16"
6 months (180 days)	Fetus	20"-24" (small dog)	7-8 qts.	5/16" (size of pencil
7-8 months	Palpate appendages	2'-3'	7-8 qts.	7/16"-1/2" Strong pulsations

Note: Can palpate fetal membranes—35-100 days. Can palpate fetal membranes and cotyledons from 90-100 days to term. (Gestation chart—modified—taken from Roberts' Veterinary Obstetrics and Genital Diseases.)

stage of pregnancy is the first item to be established. If the examination reveals an apparently empty uterus of normal size, the operator may assume the cow is not pregnant over 30 or 33 days. If a normal corpus luteum is established on either one of the ovaries, the cow could be pregnant less than 30 days.

Observation

In herds where capable personnel are in charge and good records are kept, one is generally justified in concluding that an early pregnancy does not exist if the records and history indicate the animal was not recently bred. At the request or consent of the owner or herdsman, the veterinarian is generally justified in artifically inducing heat by corpus luteum extirpation or through the injection of an estrogen.

For herds where less accurate observations are in evidence, the operator should refrain from disturbing the reproductive cycle because of the possibility of a recently established pregnancy. A subsequent examination in one to four weeks constitutes a more advisable procedure.

If a corpus luteum cannot be palpated on either ovary, it is an indication that the cow is not pregnant and is somewhere in the estrus phase of the heat cycle. When the cow is coming into standing heat, or for several hours afterward, the uterus will be found distinctly congested and firm, and a follicle in some stage of development will be noted on one or both of the ovaries.

A Rapid Survey

When palpating for early pregnancy, say between 30 and 35 days, a good procedure is to first make a rapid survey of the horns or cornua and then quickly but gently check the ovaries. If uterine horns contain fluid and membranes and one (for example the right) is larger, and a corpus luteum is located on the same side, there is good indication the female is pregnant in the right horn. Verification is made by gently palpating the vesicle. There are, of course, exceptions to all rules. Occasionally the corpus luteum will be found in the ovary situated on the opposite side of the pregnant horn. We followed through on nine such pregnancies clinically. Five carried to term, four aborted during the early half of the gestation period. We are not prepared to say whether this has significance or not.

Here are a few of the problems that seem to be most pressing to the general practitioner. One is the problem of no heat. Most cows and heifers which fail to reveal symptoms of estrus ovulate regularly. Heat periods are not observed either because symptoms are mild or are not recognized.

For various reasons, some females do not show heat symptoms at all. Under-nourished heifers, for example, sometimes undergo quiescent periods that may extend for several months. Aged females, particularly those that have produced relatively large quantities of milk during their lifetime, often exhibit hard, fibrous inactive ovaries. Inactive ovaries are also found following periods of long standing illness, debilitating disease or injury.

There are times when a corpus luteum is retained and when this happens, the cow does not have a normal cycle. Except in early fetal death or other abnormalities of the reproductive tract, the so-called retained corpus luteum usually is not a retained corpus luteum at all. In the majority of cases, the corpus luteum that we palpate is either the CL of estrum or of pregnancy. This fact should be emphasized again: in most normal females, it is not a case of failure to "show heat," but failure to "observe heat."

The Problem of Cysts

A practitioner recently expressed concern over his inability to distinguish between a follicular cyst and a cystic corpus luteum or luteal cyst. Most practitioners have little difficulty recognizing follicular cysts. The walls are usually quite thin and most rupture quite readily on gentle pressure.

Luteal cysts are relatively more difficult to diagnose than follicular cysts. But oddly enough, they occur more frequently than follicular cysts. As I gain more experience in sterility work, I feel more inclined to believe that many of the thick-walled (difficult to rupture) cysts are luteal cysts. They contain a variable degree of luteal tissue.

For my own use, I prefer to call a cyst with a relatively small amount of luteal tissue a luteal cyst and one that has a large amount of luteal tissue a cystic corpus luteum.

McEntee[1] has observed corpora lutea on postmortem examination and found relatively small numbers of small cysts in the corpora lutea of pregant cows. More and larger cysts, on the other hand, were found in cows that were not pregnant. This, as McEntee pointed out, may constitute a significant infertility factor.

Anestrus undoubtedly occurs in the presence of follicular cysts; however, I am of the opinion that many of the cysts encountered during anestrus are more often luteal than follicular. We need more information on the significance of luteal cysts and we as practitioners should endeavor to perfect our technic so that we will be able to diagnose them more accurately. Fortunately when treatment is indicated, the same hormone—a leuteinizing hormone—is used in either case.

Abnormalities are relatively common in cows, although from a percentage standpoint they are not numerous. In virgin heifers with a poor service history, the fibrous band or so-called hymen, should be considered and an examination of the vagina made to ascertain its presence or absence. If one is present, it should be removed. Freemartin heifers will be observed by their arrested development of some or all of the reproductive organs.

Double or abnormal cervix, the absence of one horn or cornu, tumors or strictures of the reproductive tract, etc., are often responsible factors in infertility. Abnormalities should be recorded on the herd sheets and their relationship to poor conception or infertility explained to the owner. Adhesions or blockage of the fallopian tubes or adhesions of the pavilion of the oviduct are not uncommon. Adhesions or plugging of the fallopian tubes (unless they are sufficiently enlarged) are often difficult to palpate. Adhesions in the area of the ovary and pavilion, however, can be readily detected.

The degree of thickening and extensiveness of adhesions of the pavilion frequently reflect the condition within the oviduct. Usually only one of the oviducts is patent. Seldom does one find a female with both oviducts obliterated.

For palpation of the pavilion, the thumb is passed directly over the downward, just beyond the anterior side of the ovary. Then with the thumb almost completely extended and with a gentle sweeping motion, a satisfactory survey of the pavilion can be made. If adhesions are present they will be encountered as thin strands stretched between the walls of the pavilion or to the ovary. The normal wall of the pavilion is very thin and pliable. When thickened from irritation or infection, the change can be quite readily recognized. These pathological findings may or may not interfere with conception.

Summary

Veterinarians as individuals and as a profession must exhibit greater interest and become more proficient in reproductive disease work to more adequately serve the livestock industry. Insofar as clinical medicine is concerned, emphasis should be placed on diagnosis—accurate diagnosis.

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Baby Pig Anemia

In an effort to determine oral and parenteral method of administration in the prevention and treatment of baby pig anemia, 175 baby pigs were either given no iron supplement, oral iron tablets, or an intramuscular injection of iron-dextran with or without an intraperitoneal injection of vitamins. Hematological evidence established the superiority of intramuscular iron-dextran. No improvement was achieved by adding an intraperitoneal injection of certain vitamins."—*Journal of Animal Science*, February 1959.

Examination of bulls for breeding soundness is an important veterinary service requiring an electro-ejaculator. Excellent commercial units are available but this "do it yourself instrument" offers maximum efficiency at low cost for the hobby minded veterinarian.

Assembling an Electronic Ejaculator

C. J. BIERSCHWAL, D.V.M., B.S.
and GENE SHIPLEY, D.V.M.

Columbia, Missouri

THERE ARE MANY ADEQUATE and well constructed electro-ejaculators on the market. These electrical ejaculators are of two types: one type uses a step-down transformer, producing 0-18 volts[1] (priced at approximately $125) and another type is chiefly an electronic device producing successful ejaculation at 30-40 cycles using an output of 5-8 volts (priced $250 to $400).[2] The less expensive ejaculators use the straight 60 cycle alternating current and a step-down transformer. Our clinic has been using this type and in most cases it has been found to be adequate. Its chief disadvantage has been found to be the discomfort caused by the higher voltage. This discomfort can be so great that restraint is difficult or impossible.

A review of the literature and personal communications indicated that there are certain requirements for a low-voltage electronic ejaculator.[2,4,5] An audio generator producing a smooth sine wave variable from at least 20 to 60 cycles, and a high quality Hi-Fi amplifier capable of amplifying the signal produced by the audio generator with as low distortion as possible are both required. After careful consideration, it was decided that an investigation of the many electronic "do-it-yourself" kits should be undertaken to learn whether equipment suitable for our purposes was being manufactured.

After an investigation of the various electronic kits available had been conducted, a selection was made from the Heath Company, Benton Harbor, Michigan, which manufactures only electronics in kit-form.[6] Both the "Audio Generator, Model AG9-A" and the 12 watt "EA-2 Hi-Fi Amplifier" were selected.

Units were purchased at a cost of around $60 and assembled. Instruction books furnished contained concise step-by-step information on assembling the unit. Pictorial wiring diagrams and schematic diagrams (fig. 1, 2, and 3) were included. These kits are designed so that they can be assembled by the novice who has no previous electronic construction experience. A soldering iron or gun, a pair of long-nose pliers, diagonal sidecutters, and a screw driver are the only tools required to assemble both of these kits.

In addition to the assembled units, a rectal electrode is required. This can be

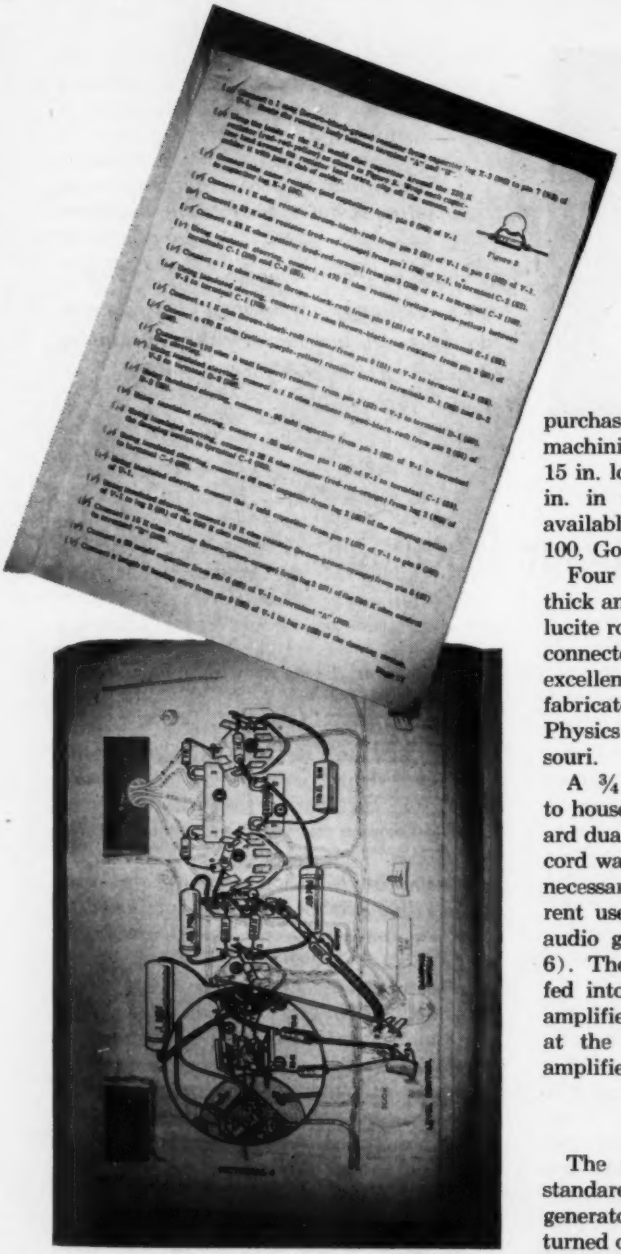

FIGURE 2

purchased or constructed of plastic by a machinist. We selected two solid lucite rods 15 in. long, 1 7/8 in. in diameter and 2 1/2 in. in diameter respectively. Both were available from the Cope Plastics, Highway 100, Godfrey, Illinois.

Four brass strips 5/16 in. wide, 1/16 in. thick and 12 in. long were embedded in the lucite rods 90 degrees apart and electrically connected in pairs 180 degrees apart. These excellent rectal electrodes (fig. 4) were fabricated by John Schnell, Machinist, Physics Department, University of Missouri.

A ¾ in. plywood box was constructed to house the instruments (fig. 5). A standard dual outlet receptacle with an extension cord was installed in the box to supply the necessary 110 volt standard electrical current used as a power source for both the audio generator and Hi-Fi amplifier, (fig. 6). The output from the audio generator is fed into standard phono-input jack of the amplifier. The rectal electrode is connected at the 16 ohm output terminals of the amplifier.

FIGURE 3

Operation and use of Ejaculator

The extension cord is plugged into a standard 110-volt outlet and the audio generator and the Hi-Fi amplifier are turned on. The rectal electrode is connected to the 16-ohm output terminals of the amplifier. A female receptacle is permanently connected to the amplifier and a male plug is attached to the probe (fig. 6). The frequency controls of the audio generator are set for 35 cycles output and the voltage controls are set at 0.2 volts. These controls

remain constant for each sequence of stimulation. The actual stimulation of the bull with the rectal probe in place is accomplished by varying the volume control on the Hi-Fi amplifier. The rectal electrode or probe is inserted into the rectum with the volume control in an off position, making certain the brass strips are inserted deep enough to avoid contact with the epidermis of the anus. The volume control is advanced about ⅛ and held for a period of 2 or 3 seconds before being returned to an off position. This sequence is repeated advancing the volume control about ⅛ further each time until ejaculation occurs. Usually ejaculation occurs before the volume control is completely advanced.

Differences in bulls at times require variation of the audio generator frequency — settings within the range of 20 to 40 cycles (in 5 cycle sequences). Sometimes a successful ejaculation is accomplished by an increase in voltage settings of the audio generator up too, but not over 0.4 volts. Each change in voltage or frequency requires a complete sequence of stimulation.

The completed machine has been used on over 70 bulls with approximately 90% efficiency. It is our observation that there is a great deal less pain exhibited by the animals than usually evident with the use of our other 60 cycle AC step-down transformer ejaculator and more efficient ejaculation. Successful ejaculations of boars and rams have been accomplished with this "Do-it-yourself Hi-Fi without music." For the veterinarian or student who is a "do-it-yourself fan," this is an inexpensive way of obtaining a high-quality electronic ejaculator. A comparable machine of this construction will cost in the neighborhood of $250 to $300.

FIGURE 4

FIGURE 5

FIGURE 6

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HELMINTH INFECTIONS IN WISCONSIN market-weight swine were reported by Goldsby and Todd in 1957, based upon collections made in 1955-56. During the course of later studies on experimental trichuriasis in swine reared in isolation, a question arose concerning the prevalence of these infections under natural conditions in younger host groups. The experimental infections were of extreme severity. It became apparent that the survey published in 1957 had not succeeded in establishing the exact prevalence and importance of *Trichuris suis* in swine.

Accordingly, a further survey of swine parasitisms by age groups of animals was conducted on 12 representative farms in Dane County, Wisconsin. The swine industry in this county, though perhaps not as important as in the southwestern counties of Wisconsin, has representative management methods and sanitation procedures. The survey was conducted from late September 1956 through early March 1957, a fact which may have influenced the findings. The prevalence of infection was established from the presence of ova recovered in identified manure samples.

Results

Of 199 samples examined, 105 (52.7%) contained the ova of *T. suis*. Samples were identified from five age groups of animals. The infections were most numerous in animals 8 to 24 weeks of age; the prevalence was much less in animals younger than eight weeks or in mature animals. (Table 1.)

From the Department of Veterinary Science, University of Wisconsin, paper NS 260. Published with the approval of the director of the Wisconsin Agricultural Experiment Station, Madison.

Swine w

Infections in the most susceptible age groups averaged 75.5% and were found to be in distinct contrast to the prevalence of 13.9% reported in Wisconsin market-weight swine.

The prevalence of Ascaris infection in the 199 animals was 64.3% compared to 65.4% in market-weight swine. The prevalence of Metastrongylus infections was 17.6%, contrasted to a prevalence of 55.8% in market swine. The overall prevalence of the roundworms designated only as "strongyles" was 39.7%. The prevalence of coccidial oocysts not differentiated into species, was 62.8%.

Discussion

At present, a somewhat more elaborate interpretation of data from surveys of helminth infections perhaps is necessary than was the case in 1920. Very simply, it is possible now to treat infection in a much greater percentage of the swine population than formerly. Moreover, the drugs of choice have been expanded from periodic ascaricides to continuous preventive systems of low-level therapy employing broad spectrum anthelmintics, which enlarge control possibilities.

TABLE 1. Prevalence of *T. suis* at 12 Farms in Dane County, Wisconsin

Age Group	Samples Examined	Samples Positive	Prevalence %	Ova Count* Range	Ova Count Mean
8 weeks	68	21	30.9	0-4,394	230.2
8-12 weeks	69	45	65.2	0-2,388	138.3
12-24 weeks	26	22	84.6	0-104	13.1
Gilts (130 to 170 lb.)	11	8	72.7	0-538	74.7
Sows and Boars	25	9	36.0	0-16	2.2

*Floated from 5 gm. samples.

Whipworm in Wisconsin

K. G. POWERS, M.S., A. C. TODD, Ph.D. and A. I. GOLDSBY, M.S.

Madison, Wisconsin

An attempt was made to evaluate management methods and sanitary procedures at the 12 farms visited in this survey. No correlation was found between standards of sanitation and prevalence of whipworms.

A thesis will be presented at a later date that the importance of trichuriasis in swine has been masked by "importance" ascribed to Ascaris infections. Present survey data can be interpreted to mean that trichuriasis is an important infection in younger swine and that a stronger acquired immunity develops to *Trichuris suis* than develops to *Ascaris lumbricoides*. The prevalence of Ascaris infection in younger pigs was determined to be 62.1%, whereas in Wisconsin market-weight swine the overall prevalence of Ascaris was 65.4%. The prevalence of Trichuris in the younger pigs was 75.5%, and this prevalence has been established to decline to 13.9% in market swine.

These data do not support a conclusion that severe trichuriasis can occur only in younger swine. Clinical trichuriasis has been produced experimentally in this laboratory in an individual pig, farrowed and reared in isolation and without previous helminth infection, aged 160 days and at 180 lb. weight at exposure.

Prevalence of infection in host groups arranged by age is not a complete demonstration of acquired immunity. Egg production on the part of *T. suis* also can serve as a criterion of host immunity. (Table 1.) The range of numbers of ova and the average numbers of ova declined from 0 to 4,394 and 230.2 in the youngest pigs to 0 to 16 and 2.2 in the oldest pigs. Egg production obviously can be conditioned by senility in the parasites. These present data were collected, of course, prior to the introduction of hygromycin as an anthelmintic.

These data by no means indicate that older, market-age swine are more susceptible to lungworm infections than younger pigs, since the survey was conducted in a season when swine cannot regularly contact an intermediate host earthworm.

The emphasis placed on the seasons of the year during which the survey was conducted illustrates the ease with which *T. suis*, the other helminths and the coccidia maintain themselves in the susceptible population in any climate.

Summary

A previous survey of helminths present in Wisconsin market-weight swine has served as a standard of comparison for a survey of *T. suis* populations in a host population arranged in age groups. By this means it has been established that *T. suis* infections achieve greatest prevalence in younger swine and that acquired immunity developed by older swine can mask the actual prevalence and perhaps the actual important of the infections.

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Editorial

PRACTITIONER VIEWPOINT on VERTICAL INTEGRATION

CLIFFORD L. McGINNIS, D.V.M.

Peoria, Illinois

DURING THE PAST TWO YEARS I have been overwhelmed by the thought of vertical integration of the livestock industry. It seems as though the term has become a dirty word—the antithesis of all that shouldn't be as far as the veterinary profession is concerned. By innuendo it has come to mean the elimination of the family farm and the complete elimination of any economic justification for the rural veterinary practitioner.

You can imagine my amazement when I found that professional economists had some decades ago coined the word to apply to the orderly growth of agriculture and its services. It was my pleasure recently to attend a lecture by Dr. O. Burr Ross, University of Illinois, and his topic was "The Effect of Vertical Integration on Illinois Farms." First of all he described the process of integration in the following way:

As an example of horizontal integration, let us describe the process of one of our national grocery chains. They have marketing facilities available so they buy a farm, feed their own cattle, and process their own meats. Or they own fishing boats, catch their own fish and process them in their own canneries. Some of the large meat packers are feeding their own cattle and hogs. You know of other similar instances.

Now vertical integration is a little different and can best be described by using the poultry industry as an example. First there is the farmer with time on his hands, land available, but no money to develop a poultry program. The lumber company will build suitable quarters to raise chickens and will take a percentage of profits. The hatchery furnishes the chickens for a percentage of profits. The feed dealer furnishes the feed for a percentage of profit and when the chickens are sold, the farmer gets what is left. But he sells them on a guaranteed contract market. So it is a cradle to grave proposition.

This is the type of integration many expect will influence the cattle and hog industry. Perhaps it will but the furor in the press is only a mental state, developed by journalists who have become intrigued by the euphonism of *vertical integration.* It is nothing new in the way of farming, nor should it affect the public relations of the good veterinarian. I have no available statistics, but I suspect that 75% of the feedlot cattle and one-half of the range cattle belong to the nation's bankers as the result of loans, and always have.

Any farmer who is farrowing 100 sows per year can probably manage his own financing, for hogs are a relatively fast turnover. But if this same farmer jumps to

500 sows per year, someone else is going to share the investment burden. Whether the banks will undertake to finance these operations as they have in the past at their usual interest rates remains the No. 1 question in any discussion of the swine industry. If bankers feel that the risk is too great, private money will have to fill the void, demanding a percentage of profits rather than a fixed rate of interest. Here again we approach integration.

So agriculture differs from industry only in name, for the less efficient and the less capable are going by the board, and only the capable persist. Is this new? Certainly not, for the revolution in industry is being paralleled in agriculture. Politicians' attempts to control farmers' votes with price supports have slowed the process, but that won't last. Subsidization of farm products is no more realistic than subsidization of General Motors or U. S. Steel and it is bound to be abandoned.

This whole process in the evolution of agriculture should only enhance the value of a veterinarian's services to his community. This is because disease has broken the backs of more livestock producers than any other factor in a successful operation. The other factors are financing, marketing, feeding, and management. If health and sanitation procedures break down, death losses can soon put a producer out of business.

The veterinarian is the only man in a community who is qualified by training and education to diagnose and treat diseases of livestock. He is also the logical one to advise and institute a course of preventive medicine. He can only do this if his training and education are adequate and this in turn reflects the abilities of our educational facilities. It is not sufficient that a veterinarian know the names of all the anatomical structures of the body. It is not sufficient that he know pathology, bacteriology, or that he can give a learned treatise on the history of civilization — although these are important. Somewhere along the line he should have spent some time sitting on the corral fence, watching a bunch of steers on full feed or a herd of young pigs hammering the self feeders. He must know as much as the feed dealer about mixing rations and as much as the geneticist about hybrids. The livestock people of the United States need the advice and services of an expert, an unbiased expert, one who has nothing to sell but his services. He does not know you are an expert unless you tell him. No one else will do it for you.

May I suggest one idea from my attorney's practice. He collects a retainer fee from some 45 or 50 large and small businesses. If during any one month he is called on for a greater amount of services than the retainer fee justifies, he makes an additional charge. Many months he is never called on but his fee is paid just the same. This could be true of your practice and it can vary to fit the circumstances.

So be not disturbed about vertical integration destroying the veterinary profession. Never in our brief history have we been in a position to command the trust and confidence of the livestock industry to the extent that we do today and I am confident that it will grow and flourish.

Parakeratosis

Brink *et al.* of the Illinois Agricultural Experiment Station in a project in which 92 weanling pigs were used determined that zinc carbonate as a feed additive or supplement was not tolerated at a higher rate than 0.1%. The addition of dicalcium phosphate to the extent of 1% had no effect upon the toxic evidence of the zinc. The toxic symptoms of excessive zinc consisted of deranged appetite, weight loss, catarrhal enteritis, arthritis, hemorrhage in the axillary spaces and cerebral ventricles, and death in 21 days in some animals.— *R. R. Dykstra, D.V.M.*

Here each month are published ideas, suggestions and comments picked up by VM reporters at veterinary meetings.

The Meeting Circuit

Ultrasonic Therapy

THE ILLINOIS INTERPROFESSIONAL COUNCIL has reported favorable results following use of ultrasonic therapy in the treatment of plantar warts in human beings. In a preliminary report it is stated that after ultrasonic therapy the warts darken in color, with gradual sloughing so that the warts become dry and scaly. Pain disappears immediately. After a course of ten treatments —15 minutes each—normal tissue appears on the lesion site. It is indicated that relatively little damage reaches normal, surrounding tissue of the plantar wart. Ultrasonic therapy has also been used in such conditions in human beings as osteoarthritis, rheumatoid arthritis, etc.

Combating Vesicular Diseases

LYE (sodium and/or potassium hydroxide) in 3% solution after an exposure of two hours failed to inactivate the virus of vesicular stomatitis, although it is effective against the vesicular exanthema virus, according to a report by Patterson *et al.* before the United States Livestock Sanitary Association.

Lye has for years been extolled as the agent of choice in combating both of these viruses. Soda-ash (commercial anhydrous soda carbonate) the report states, "has no value as a disinfectant for vesicular stomatitis virus and vescular exanthema virus." Formalin (formaldehyde solution containing not less than 37% of formaldehyde gas) in a 1:100 dilution inactivated the virus of vesicular stomatitis virus within ten minutes.

Multiple Vaccines

MULTIPLE VACCINES are gaining headway. Recently the National Institute of Health approved for human use an immunizing combination against diphtheria, pertussis (whooping cough), tetanus and poliomyelitis. The four antigens making up this combination when used have given no evidence of interference with each other—in fact a synergistic effect seems to be evident. Children from two months to five years of age are given three to four monthly injections followed by a booster dose of the quadruple vaccine 18 months later.

Reduction of Mastitis Incidence

IN A HERD of 500 Holstein-Friesians, the the employment of the California Mastitis Test at monthly intervals, sensitivity testing of positive and treatment with nitrofurazone (Furacin—Eaton) in combination with other drugs, reduced the mastitis rate from 14 to approximately 3% in six months.

Mastitis due to hemolytic staphylococci, streptococci and Corynbacterium species was treated with Furacin and penicillin. Furacin and Neoprontosil were used successfully against rough-colony forms of *Escherichia coli* that are refractory to treat-

ment. Non-hemolytic staphylococci, *E. coli* and Proteus species were treated with Furacin solution alone.—*Robert A. Jackson, D.V.M., Second Regional Conference on Nitrofurans.*

Virus Diseases of Cattle

AT THE 62ND ANNUAL MEETING of the United States Livestock Sanitary Association, Dr. O. G. McKercher, University of California, reported that infectious bovine rhinotracheitis (IBR) can be transmitted to goats and that these animals harbor the virus for a longer period in some cases than cattle. Cattle exposed to the virus by ocular inoculation undergo a mild form of the disease, which normally escapes detection under field conditions, but harbor the virus in the ocular secretions.

Cattle were found to develop neutralizing antibodies in the blood to the IBR virus, and to be solidly immune to reinfection for at least one year after clinical recovery.

A virus isolated from a case of shipping fever, on inoculation into calves, produced a mild reaction. Antibodies which developed in response to inoculation with this agent were demonstrated also in cattle that had recovered from shipping fever.

Phenol Poisoning

AN UNUSUAL CASE REPORT from the Kansas State University Extension Department tells of a farmer who doused 70 shotes with what he thought was "hog oil." Most of the animals became comatose within half an hour and one-third died within 24 hours. Although the remainder were rinsed with water in two hours, all were severely burned and rendered valueless as feeders. Diagnosis —phenol poisoning.

This case brings to mind an equally unusual but less disastrous case relayed by a senior colleague. It seems that an Iowa veterinarian had performed routine worming of a client's swine with oil of chenapodium. Shortly after returning to the office, the farmer was on the phone and wildly hysterical. He reported that his pigs were all running around blowing bubbles. A quick check revealed that the oil of chenapodium barrel was stored next to a barrel of liquid soap and a slight mistake had been made in faucets.

Fortunately the pigs suffered little harm and the whole incident became a humorous precautionary reminder.

Fractures in Cattle

DR. E. L. SYMINGTON reported successful use of a modified Mason Meta splint in 18 bovine fractures to the New England Veterinary Medical Association. The report was published in *The Veterinarian*, vol. 4., no. 3.

Suitable for any fracture below the knee or hock, the splint is a piece of angle iron bent at one end to form a foot rest or shoe which is split to form a narrow V to conform to the toes of the animal. The toes have a vertical bar across the end to keep the foot from slipping forward. The shaft which fits snugly to the posterior part of the leg is cut out to allow for the dew claws, and has two or three eyelets for straps to buckle around the leg, e.g., the foreleg is nearly vertical whereas the hind leg has a decided obtuse angle. Large, medium and small splints are carried at all times.

In applying the splint, a tranquilizer is administered intravenously. The splint is then adjusted to the leg to determine the proper angle and removed. Often the toes have to be trimmed to fit the foot piece. A layer of cotton and gauze is applied and followed by a heavy leg bandage. Next the splint is applied and an attempt is made to reduce the fracture.

If the fracture is from the anterior part of the leg and runs down and back, the animal is put up on its toe slightly. If the break is posterior and runs down and forward, the animal is positioned on the heel.

After the splint is fitted properly and strapped in place, the toes are taped to the foot piece and the shaft and leg covered with a heavy bandage to help prevent the splint from slipping from side to side. Plaster of Paris bandage may be used in lieu of the leg bandage.

The owner should be directed to keep a close watch and adjust any side slipping or call the veterinarian for help. The patient should be examined at least once a week, or more often if necessary, until the splint is removed. The splint is left in place from four to six weeks, depending on the nature of the fracture.

After becoming accustomed to the splint, the animal shows no discomfort and moves around freely on it with no difficulty in getting up or down. In cases treated this way, healing has generally been adequate although in a few case osteomyelitis developed.

The 54th annual meeting of the American Dairy Science Association was held in Urbana, Illinois, June 15-17. This related field of scientific endeavor always provides research reports of interest to veterinarians. The following highlights are selected from this program for their special veterinary significance.

Strontium

DURING THE DAIRY SCIENCE ASSOCIATION sessions held in Urbana, Illinois recently it was again asserted that the danger to human beings from strontium 90 contaminated milk is almost nil, and further evidence from the University of Tennessee and the United States Atomic Energy Commission indicates that an ionizing device—it is not yet entirely perfected for commercial use—can filter out 90% of the strontium. In principle the device is similar to water softeners now in general use.

There is no question that strontium 90—its deadly radioactivity has a half-life of 28 years—in large enough dosage can etiologically result in human leukemia and bone malignancy. Because plants will take in calcium and strontium 90 almost indiscriminately when the latter is deposited on the soil by fallout, cattle forage may be contaminated, but it is asserted that 95% of such strontium is eliminated in the digestion process, leaving only 5% in the animal's body. Finally, milk contains about one-tenth as much strontium 90 for each unit of calcium as do grains and vegetable roughages.

Induction of Lactation

H. H. OLSON and J. R. Davis, Southern Illinois University, Carbondale, Illinois, noted recent reports indicated that daily injections of progesterone and estrogen at the ratio of 1,000:1 for 180 days, followed by estrogen injections for 2 weeks, induces near normal milk flow in cattle.

In their studies, two animals treated in this manner received 3 mg. diethylstilbestrol for three weeks; and due to poor response they were given another 6 mg. daily for an additional week. Milking began on the 14th day of estrogen treatment. Maximum production was 11 lb. on the 40th day of lactation in one animal, and 23 lb. on the 65th day of lactation in the other.

Another pair of infertile animals received progesterone and estrogen for only 90 days. The treatment was followed by 3 mg. daily of diethylstilbestrol for three weeks. Peak milk production was 25 lb. on the 18th day of lactation for one animal, and 23 lb. on the 20th day for the other.

Antibiotics in Milk

K. M. SHAHANI, University of Nebraska, reported that a green-turquoise dye when mixed with penicillin preparations and infused intramammarily will appear in the milk, coloring it green, and provide a method for visual detection of antibiotic in the milk. The dye was secreted in the milk as long as Terramycin, aureomycin, or polymyxin, but longer than Streptomycin. Age and breed did not seem to affect the number of milkings in which the dye appeared.

During the storage of antibiotic-dye mixtures for several months, the dye had no appreciable effect on antibiotic stability. The dye causes no ill-effects on the milk yield, irritation to tissues, or apparent toxicity when ingested.

Practitioner's Laboratory

W. L. SIPPEL, V.M.D., Ph.D.

Florida Livestock Board
Kissimmee, Florida

Urinalysis

The kidneys are vital organs and study of the urine will reveal information of diagnostic and prognostic value.

Obtaining the Specimen

The collection of adequate uncontaminated urine samples sometimes presents a problem to veterinarians. Natural collections are best except for specimens to be cultured. These can often be obtained when the animals first arise in the morning by alert attendants using a container on the end of a stick. Many animals will urinate if kept quiet during the morning and then disturbed around noon. Another method that will work for some small animals is the use of a urine collection cage with a bottom drain under which the container is placed. Pressure on the bladder applied externally to small animals is often effective; however, this method should not be used on animals with cystitis or calculi. Under some circumstances an aseptic tap of the bladder with a hypodermic needle and syringe from the ventral abdominal approach may be justified. In the interest of time, one must often resort to the catheter. These instruments should be sterile, lubricated, and in good condition. Male catheters should be pliable. It is best to avoid the use of catheters in male animals if possible as their frequent use will often harm the patient by damage to the urethra. Such samples, with trauma-induced constituents, will give misleading results.

In cows, urination can usually be induced by stroking the escutcheon below the vulva. Horses will often respond to persistent whistling or the placing of fresh bedding in their stall. Pressure on the bladder per rectum or catheterization are also used in large animals.

After obtaining the specimen, a routine should be established which will furnish the desired information with a minimum of effort and time. Lay help can be utilized for most urinalyses.

The tests that should be done routinely are:

1. Note physical characteristics of specimen, i. e., color and transparency, specific gravity, and pH.
2. Urinary sediment examination.
3. Examinations for various constituents (when indicated): albumin, acetone, bile, urobilinogen, indican, sugar, sulfonamides.

Physical Characteristics of Urine

The sample should be collected in a chemically clean clear glass container. After collection, the color and transparency should be noted. The hydrogen ion concentration (pH) should be noted and the specific gravity determined by use of the hydrometer.

Color

The normal yellow color of urine is due to urochrome, an endogenous pigment of unknown origin. The color varies with the amount of water present, but the daily amount of urochrome eliminated is rather constant in health. It rises in starvation or increased tissue breakdown or in conditions of increased metabolism, including fever and hyperthryoidism. Certain drugs (phenothiazine) and dietary constituents influence the color of urine. In veterinary medicine, the yellow color of bile pigments or the red of hemoglobinuria or hematuria and the darker red or black of myoglobinuria are the most often encountered abnormal colors. Bile pigments are seen in jaundice from

various causes. Hemoglobin is noted as a result of the various causes of intravascular hemolysis and myoglobin following an attack of azoturia in equines. Bile and myoglobin pigments will also be noted in the blood serum when seen in the urine.

Transparency

Turbidity in urine may be due to crystals in suspension such as carbonates, urates, or oxalates. Pus cells, red cells, epithelial cells and in the horse, mucus, may cause turbidity. Turbid red urine is usually due to hematuria resulting from escape of red cells into the urinary tract. The turbidity distinguishes hematuria from hemoglobinuria, the urine being clear in the latter condition. A test for hemoglobin, such as the benzidine test, can be run to determine if the red urine is from blood breakdown and not drugs or plant pigments.

Reaction

In general, the urine of herbivorous animals is alkaline (pH 7.5-8.0), that of carnivorous animals is acid (pH 6.0-7.0), while that of omnivorous animals may be either. The reaction of all may be altered artificially or by disease. Nitrazine paper (Squibb) is convenient for pH determinations on urine. It is dipped into the urine and the color which develops is compared with a color chart. Fever, ketosis, anorexia or starvation tend to lower the pH of the urine of all species. Cystitis and conditions resulting in blood proteins in the urine (albuminuria) cause increases in the reaction.

Specific Gravity

The specific gravity is determined by use of the hydrometer. For small animal practice, a micro instrument will be necessary to utilize the small quantities usually available, (Clay-Adams, Inc., 141 E. 25th St., N. Y. 10, N. Y., Midget Urinometer A2747B, about $3.00). The container with this equipment is a 15 ml. tapered centrifuge tube which can subsequently be used for the urine sediment test. Larger models are easier to read and are recommended wherever urine quantities permit.

Specific gravity values vary as follows:

Horse	1.020 - 1.050	avg. 1.035
Cow	1.025 - 1.045	avg. 1.035
Sheep & Goat	1.015 - 1.045	avg. 1.030
Dog	1.015 - 1.045	avg. 1.025
Cat	1.020 - 1.040	avg. 1.030
Pig	1.010 - 1.030	avg. 1.015

The specific gravity varies inversely with water consumption. If the kidneys are damaged and unable to concentrate urine, the specific gravity will be low. Coffin[1] lists a practical kidney function test in which the specific gravity of a first sample is noted. The animal is kept on dry food and without water for 12 hours when a second urine sample is obtained. If the specific gravity of the second sample is also low, the animal is obviously unable to concentrate its urine and probably suffering from chronic nephritis with interstitial hyperplasia or diabetis insipidus.

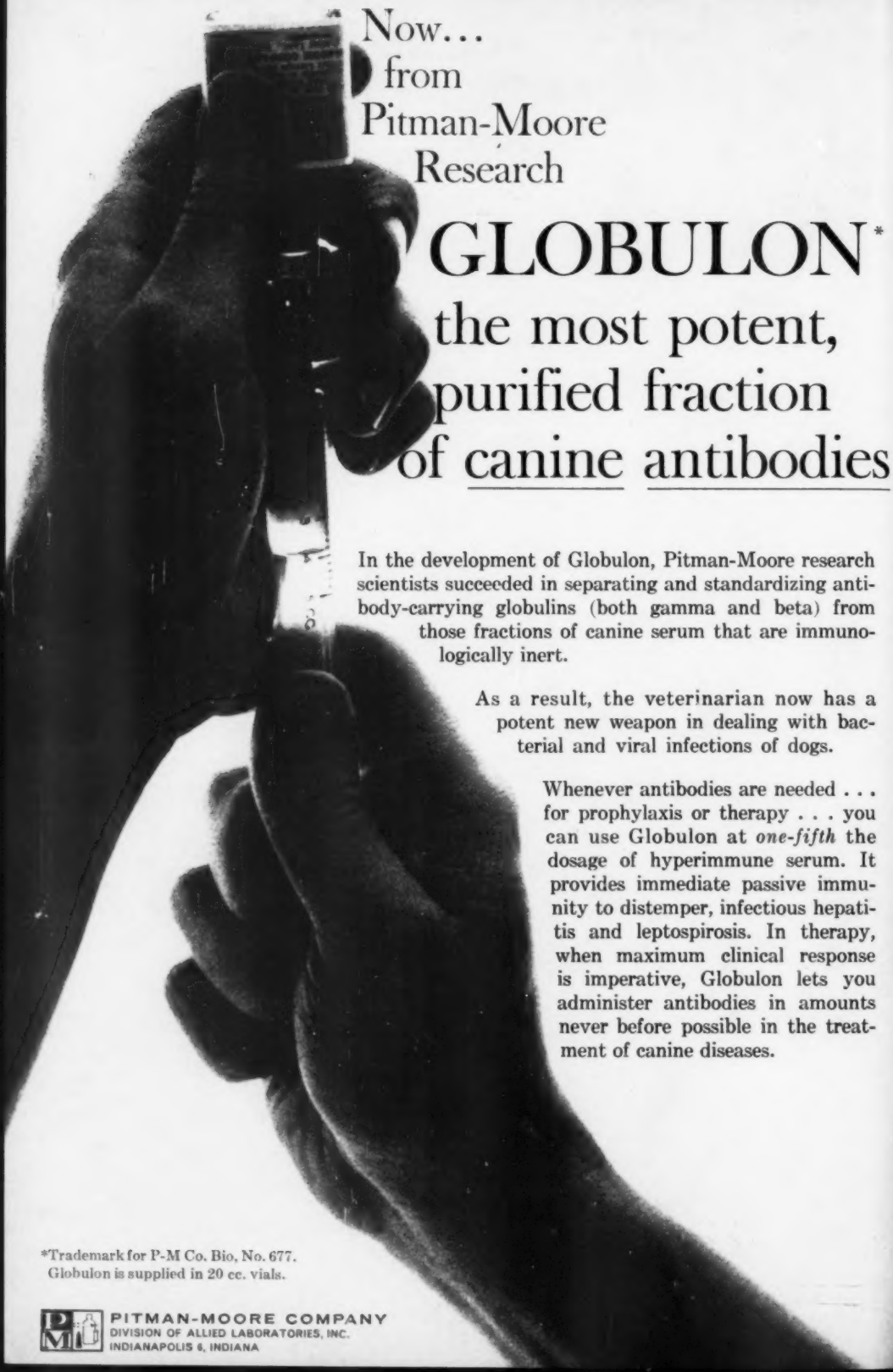
REFERENCE

1. Coffin, D. L., Manual of Vet. Clinical Path. 3rd Ed. Comstock Publishing Assoc., Ithaca, N. Y., 1953.

Transmissible Gastroenteritis

Complaints from hog raisers and breeders indicate the presence in isolated areas of the middlewest of transmissible gastro-enteritis with a comparatively large loss of pigs less than two weeks of age. The condition has all the appearances of a virus infection transmitted by contaminated feed sacks, footwear, and other animals. There is some evidence of relationship between the disease and farrowing — therefore a three or more months break in the farrowing cycle is advocated by some practitioners. Sanitation is also important. One practitioner informed us that he had broken up the ailment, in his opinion, by medication of pregnant sows with one of the nitrofurans in therapeutic doses in the feed. Sows that have had the disease can safely be rebred.

SMALL ANIMAL PRACTICE



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IMMUNOLOGY OF CANINE DISTEMPER

R. V. JOHNSTON, D.V.M., C. J. YORK, D.V.M., Ph.D., V. B. ROBINSON, D.V.M., Ph.D., A. H. BRUECKNER, Ph.D. and G. R. BURCH, D.V.M.

Pitman-Moore Company
Indianapolis, Indiana

MUCH OF THE RECENT RESEARCH on canine distemper is based on the virus neutralization test in embryonated chicken eggs. Adaptation of canine distemper virus to the embryonated egg has been a boon to research. This technic provides relatively inexpensive means for assay of the virus and antibody, and partially supplants the need for many elaborate and costly isolation facilities necessary to maintain test dogs or ferrets. However, the test has several shortcomings. It cannot be used to detect virulent virus; it is subject to many variables; and any conclusions drawn from use of the test must be verified by tests in dogs. For example, it is possible to determine the amount of modified virus present in a vaccine, but this does not show how much virus is necessary to immunize a dog. Similarly, it is possible to determine how much antibody is present in a serum sample, but this does not show how much is needed to protect a dog.

Presented at the 75th annual meeting of the Indiana Veterinary Medical Association, Indianapolis, Indiana, January 14, 1959.

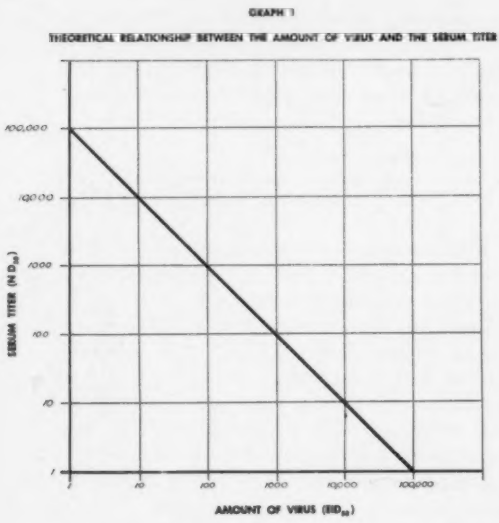
The Virus Neutralization Test in the Embryonated Egg

The chorio-allantoic membrane of a fertile chicken egg which has been incubated about 12 days is pictured in figure 1. It is a thin, almost transparent membrane with numerous blood vessels. When the modified living canine distemper virus is inoculated on a six-day-old membrane and incubated for about six days, it produces small white edematous lesions (fig. 2). Therefore it is possible to determine the titer of the modified virus by finding the highest dilution which will cause lesions.

Development of lesions is specifically inhibited by the serum of dogs which are immune to distemper. Therefore it is possible to determine the antibody titer by finding the highest dilution of serum which will inhibit the virus and thus prevent development of lesions.

There are several important variables in the serum neutralization test which must be considered. Several writers[1,2,3] have demonstrated that there is an inverse relationship between the amount of virus used in the test and the resulting antibody titer as depicted in the hypothetical example in figure 3. If there is a tenfold increase in the amount of virus, there is a tenfold decrease in the antibody titer. An antibody titer is meaningful only if the amount of virus is known. A report by Gorham[4] indicates that different strains of the egg adapted virus may have a different affinity for the antibody. Finally, some confusion has followed reports in the literature relating the antibody titer to the volume of the test dose used in the egg (usually 0.1 cc.), whereas others have related the titer to a common denominator of 1 cc. An antibody titer must be stated in terms of the quantity of virus used, the strain of virus used, and the volume of serum tested.

Variables make it difficult to compare the antibody titers obtained at different laboratories. There are several possible meth-



ods for standardization of results. Perhaps the best method would be to have a standard reference serum which would be included in each series of tests. Possibly the United States Department of Agriculture could provide such a standard at some future date.

Since there appears to be an inverse linear relationship between virus and serum concentrations, it would be possible to relate all antibody titers to a certain common denominator of virus, for example 100 EID_{50} (egg infectious doses at the 50% endpoint). In other words, if a serum were tested against 500 EID_{50}, results would be multiplied by 5 (500÷100), or if a serum were tested against 50 EID_{50}, the results would be multiplied by 0.5 (50÷100). This is important because it is impossible to predict precisely how much virus is being used in a particular test. Unless otherwise stated, the antibody titers reported here are defined as the smallest amount of serum which will neutralize the effects of about 100 EID_{50} per test dose of 0.1 cc. To convert to a basis of 1 cc., the results should be multiplied by ten.

The Immune Titer

What concentration of antibodies is necessary to protect a dog against infection? What concentration of antibodies indicates that the dog has recovered from the infection? These questions cannot be answered with certainty. Gillespie[5] reported that puppies with passive antibody titers of less than 20 (per 0.1 cc. against about 300 EID_{50} of the Onderstepoort strain of virus) were susceptible to infection with virulent virus, whereas those with titers greater than 30 were protected. York[6] has found that puppies with passive antibody titers of less than 20 (per 0.1 cc. against about 100 EID_{50} of the Virovax strain of virus) were responsive to immunization, whereas those with titers greater than 50 were not responsive. York and co-workers[7] reported that dogs vaccinated with the modified live distemper virus vaccine (in combination with the modified hepatitis virus, Virovax D-H—Pitman-Moore) had an average antibody response of 1,500. Ott[8] reported that vaccinated dogs regularly developed a titer of about 3,000 per 0.1 cc. against 100 to 500 EID_{50} of the Onderstepoort strain of virus. Gorham[4] reported that 21 different commercial antiserums had an average titer of about 225/0.1 cc. against 320 to 530 EID_{50} of four different egg adapted viruses. It has been concluded by Baker[9] that an antibody level of about 300 per cc. (30 per 0.1 cc. against about 300 EID_{50} of virus) is protective.

Passive Antibody Interference

Following the original work of Ott,[10] several workers[5,9,11] have found that a passive immunity acquired either from an immune mother or from a dose of antiserum will interfere with the active immune response to either the modified or virulent distemper viruses. Gillespie[5] has found that the newborn puppy has an antibody titer equivalent to 3% of the dam's titer, presumably by transplacental transfer, and that after suckling, the puppy's titer is 77% of that of the dam. He also estimated that this passive immunity is lost at the rate of 44% per week, and that the puppy will become susceptible (both to disease and to vaccination) after one to 12 weeks, depending upon the dam's titer. It is for this reason that vaccination is recommended at 12 weeks of age.[12] It is also recommended by Baker[9] that vaccination be delayed for at least two weeks after a dose of antiserum. It is possi-

ble that multiple doses of serum may have a cumulative effect, causing interfering levels to persist for more than two weeks. It has been previously reported by Brueckner[13] that the simultaneous use of antiserum does not interfere with the immune response to the Virovax strain of virus.

The Anamnestic Response

The finding that passive antibodies may interfere with the active immune response and the finding by Gillespie[5,7] that six of 17 actively immune puppies did not develop an increase in antibody titer following a dose of the egg adapted virus, has apparently caused some writers[14] to believe that there is no anamnestic response (booster or recall effect) to distemper antigens. However, 11 of 17 puppies tested by Gillespie showed an increase in antibody titer and four of them more than doubled. The mean average increase was 31.2%. Furthermore, most of these puppies had just previously recovered from distemper, and if they had been first immunized by vaccination, or if a longer time had lapsed after recovery from the disease, the booster effect would probably have been even greater.

York[6] has found that a dose of the egg adapted distemper virus given about six months following the first dose, produces an average increase in the antibody titer of 250%, as depicted in graph 2. These data are based on the average response of dogs, and show that there is a significant booster effect in immune dogs. This is the effect that is to be expected based on immunological principles, because the anamnestic effect occurs only in actively immune animals, not in the passively immune.

Strains and Types of Virus

A strain of virus may be defined as any "isolate" or "culture," and each may be given a different designation even though it may be identical to other strains. On the other hand, a "type" of virus is immunologically different from all other types, just as the eastern type equine encephalomyelitis is immunologically different from the western type. There are an infinite number of strains of distemper virus, whereas only

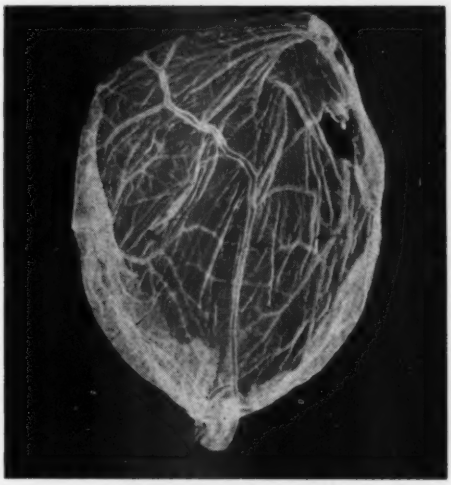
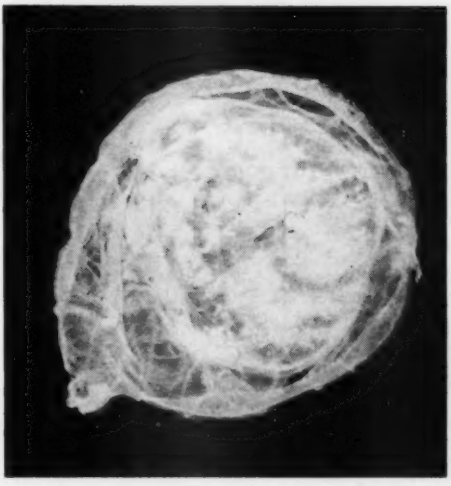


Fig. 1. Chorio-allantoic membrane of a fertile chicken egg which has been incubated about 12 days.

Fig. 2. White edematous lesions evident when modified living canine distemper has been virus inoculated on a six-day-old membrane and incubated about six days.



one immunological type has been clearly defined. Various strains of virus may differ in some of their characteristics, such as virulence, ability to propagate in the egg, ability to produce encephalitis, etc., but so long as they immunize against each other, they are of the same type.

In 1948, MacIntyre and co-workers[19] reported that the so-called hard pad syndrome appeared to be caused by a separate virus. In 1946, following a study of 52 different strains in ferrets, Larin[15] in England classified the strains into three types as depicted in table 1. The classification is based primarily on clinical signs rather than on immunological tests. Some of the ferrets which recovered from one group of viruses were not immune to those of another group.

Various American workers[16,17] have reported that all the strains of virus studied by them were all of the same immunological type. Robinson and Newberne[18] have studied several different strains of virus which were isolated from dogs exhibiting a variety of syndromes in different geographic areas (table 2). So far, all strains have produced the classical signs of canine distemper in susceptible animals, and no symptoms at all in animals immunized with the Virovax strain of virus, indicating that all strains studied are of the same immunological type. The conclusion by several workers[16,17] that the hard pad syndrome is only a different manifestation of canine distemper seems to be justified.

Prophylaxis Against Canine Distemper

1. *The antibody response to the inactivated virus vaccine.* The inactivated virus vaccine was developed many years before the virus neutralization test was available, thus there was no method for quantitative assay of the antibody response. The efficacy of the vaccine was tested by the direct approach of vaccinating and challenging a group of puppies. A recent report[22] shows that three doses of the inactivated virus vaccine (Virogen) will protect a dog against an intracerebral inoculation of the virulent Snyder Hill strain of virus which regularly produces encephalitis and death in susceptible dogs following this route of inoculation.

In a recent test, serum samples were collected from a similar group of 24 puppies prior to vaccination and again one week after the administration of three 5 cc. doses of Virogen D-H at weekly intervals. Serum samples were collected from 17 littermate controls at the same time. Results which are summarized in table 3 show that the

GRAPH 2

THE AVERAGE ANTIBODY RESPONSE OF 32 PUPPIES FOLLOWING ONE OR TWO DOSES OF MODIFIED LIVING CANINE DISTEMPER VIRUS

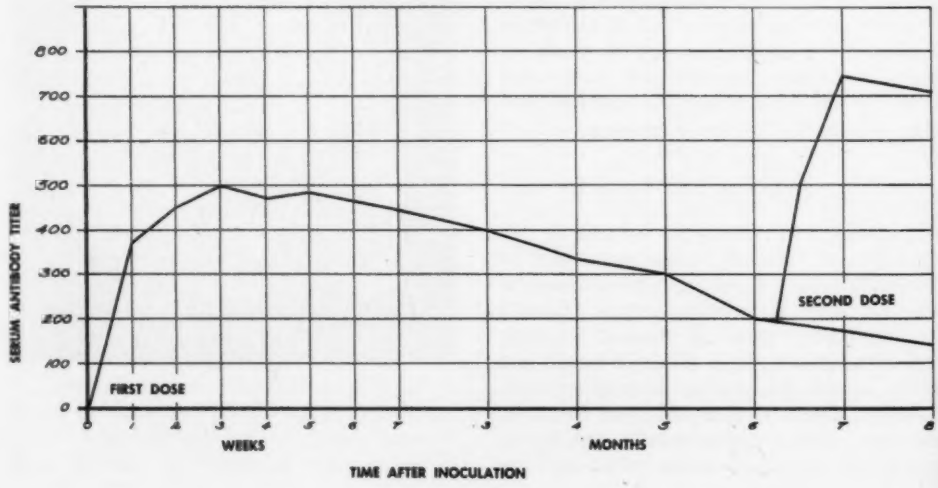


TABLE 1. A Study of 55 Strains of Canine Distemper Virus in Ferrets in England*

Group	No. Strains	Syndrome	Effect of Passage	Gross Protection
A	8	Typical Laidlaw-Dunkin	Unchanged	Yes
B	17	Very variable	Produced Types A & C	Not always Against A
C	30	Very mild	Usually unchanged	Not always Against A

*Larin — J. Comp. Path. 65:325

average antibody response of the vaccinated puppies was 1,073 per 0.1 cc. of serum against about 100 EID_{50} of virus, and that all puppies were immune to challenge. None of the control puppies developed antibody titers and all remained susceptible.

2. *The immune response to a combined inactivated vaccine for distemper, hepatitis and leptospirosis (Virogen DHL).* Recent studies[11] have shown that the inactivated virus vaccines for distemper and hepatitis may be combined with the *Leptospira canicola* bacterin without interfering with the safety or immunogenicity of any of the three antigens. The results of these studies which are summarized in table 4 show that the combined vaccine will protect puppies against a virulent challenge with any of the three agents which produced disease in the littermate controls.

3. *The protective value of hyperimmune serum and immune globulin against distemper, hepatitis and leptospirosis.* In a previous report, Brueckner[23] showed that dogs could be hyperimmunized simultaneously against canine distemper, infectious canine hepatitis, *Leptospira canicola, Brucella bronchiseptica,* Streptococcus species, and *Salmonella typhimurium.* He demonstrated that a dose of 0.5 cc. per pound of the serum would protect dogs against challenge with any of the three disease agents.

TABLE 2. Results of Animal Inoculation Tests for Canine Distemper from Field Cases

Case No.	State	Date	Type of Clinical Symptoms	Histopathology Findings	Disease Produced in Susceptible Ferrets	Disease Produced in Distemper Immune Ferrets
1	Wash.	Nov. 1957	No history	No studies	Distemper	None
2	Alaska	Nov. 1957	Encephalitis	Inclusions	Distemper	None
3	S. C.	Feb. 1958	Systemic	No lesions	None	None
4	N. Y.	May 1958	Systemic & encephalitis	No studies	Distemper	None
5	Ind.	May 1958	Encephalitis	Inclusions	Distemper	None
6	Calif.	June 1958	Encephalitis	Inclusions	Distemper	None
7	Ind.	June 1958	No history	Inclusions	Distemper	None
8	Calif.	June 1958	Encephalitis & hard pads	Encephalitis	Distemper	None
9	N. Y.	June 1958	Systemic	No studies	None	None
10	N. Y.	June 1958	Encephalitis & hard pads	Inclusions	Distemper	None
11	W.Va.	July 1958	Encephalitis & hard pads	Inclusions	Distemper	None
12	Mich.	Sept. 1958	Systemic & encephalitis	No studies	None	None
13	Ohio	Nov. 1958	Encephalitis	Inclusions	Distemper	None
14	Calif.	Nov. 1958	Encephalitis	Inclusions	Distemper	None
15	Penn.	Dec. 1958	Encephalitis & hard pads	Inclusions	Distemper	None

Puppies which were given 0.25 cc. per pound did not show any clinical signs following challenge with a virulent strain of *L. canicola;* however, leptospira were isolated from the blood stream.

Recently, Brueckner and associates[11] have separated the antibody fraction from the hyperimmune serum by a process similar to that used for the production of poliomyelitis immune globulin. The protective value of this canine globulin is about five times that of the parent serum. The antibody concentrate in a dose of 0.1 cc/lb. or less protected puppies against distemper, hepatitis and leptospirosis. The protective value of the unconcentrated serum in doses of ½ cc. per pound body weight was reaffirmed.

4. *The response of susceptible and immune dogs to the modified living viruses for distemper and hepatitis, used either singly or in combination.* It has been reported by York and co-workers[7] that the combined modified living viruses of distemper and hepatitis would produce an immune response against both diseases in susceptible puppies. It was then asked if a dog which was immune to one of the diseases would develop an immunity to the other disease following administration of the combined vaccine. York[8] compared the immune response of susceptible and immune puppies to the modified viruses when used singly and in combination. The results summarized in table 5 indicate that the combined vaccine stimulates the same degree of immunity as do the monovalent vaccines in either immune or susceptible dogs. There is additional evidence that a booster effect is produced in immune dogs by both the distemper (group 6) and the hepatitis (group 7) vaccines.

5. *The immune response of young puppies.* It has been noted previously that the presence of a passive immunity in the suckling puppy may interfere with the active immune response to the living distemper antigens. This raises the question as to whether or not a similar interference occurs with the inactivated virus vaccines which contain a much greater mass of "preformed" antigen. A 5 cc. dose of Virogen represents about 1,000,000 dog infectious doses of virulent virus compared to something over 1,000 egg infectious doses of virus in a dose of the modified virus. Even if there is some degree of interference with the killed virus, it may be that multiple doses will stimulate an active immunity in the passively immune dog.

This theory has been tested by Burch and Lee[24] by administering six or seven weekly doses of about 1 cc. of Virogen D-H to all the puppies born in a kennel of purebred Brittany Spaniels, and later testing the immune levels either by antibody titration or by challenge or both. During the last two years, the procedure has been used succesfully on 33 puppies. Serum samples were collected from 12 of the puppies when they were about two months old and the average titer was 114. Twenty-four of the puppies were given a booster dose of the living virus vaccine (Virovax D-H) when they were about three months old, and the serological response is presently being determined. Thirteen of the puppies were subsequently challenged by the intentional inoculation of virulent virus, and none of them developed distemper. The average antibody titer of this group is also being studied.

In previous years numerous puppies in this kennel had succumbed to distemper infection. Since inauguration of the above program, none of the vaccinated puppies has developed distemper and only one has died from any cause. In fact, the owner says that the puppies have been extraordi-

TABLE 3. The Antibody Response to Virogen

No. Littermate Puppies	Status	Average Antibody Titer Before Vaccination	Average Antibody Titer After Vaccination	No. Remained Well	Response to Challenge* No. Sickened and recovered	Response to Challenge* No. Died
24	Vaccinated	0	1073	24	0	0
17	Controls	0	0	0	7	10

*The challenge consisted of an intracerebral inoculation of ½ cc. of 10% brain tissue suspension of the Snyder-Hill strain of canine distemper virus.

TABLE 4. The Immune Response to a Combined Inactivated Vaccine for Distemper, Hepatitis and Leptospirosis (Virogen DHL)

No. Puppies	Status	Type Challenge	Results of Challenge: No. Remaining Well	Results of Challenge: No. Developing Specific Disease
10	Vaccinated	Distemper	10	0
7	Controls	Distemper	0	7
6	Vaccinated	Hepatitis	6	0
2	Controls	Hepatitis	0	2
15	Vaccinated	*L. canicola*	14	1
7	Controls	*L. canicola*	0	7

narily healthy and vigorous, and one of them has won the national championship.

The results of this preliminary trial suggest that the method is worthy of trial in other kennels under similar circumstances. It also suggests that a possible method for protecting young puppies of any age is the administration of the killed virus vaccine until they are old enough (12 weeks) to receive the modified live virus vaccine. This is a method that is used by many practitioners.

Summary

The virus neutralization test in embryonated chicken eggs is an accurate method for assaying canine distemper antibodies if consideration is given to the amount of virus and the strain of virus used in the test, and to the volume of the test dose. Unfortunately, failure to take these variables into account has caused wide differences in results obtained at different laboratories, and it is not clear exactly what is a "positive" or a "protective" titer.

Use of the virus neutralization test has demonstrated that passive antibodies, gained either from an immune dam or a dose of antiserum, may interfere with the active immune response to the living viruses, either modified or virulent. While this finding has suggested to some that actively produced antibodies may prevent a "booster effect," new evidence is presented here which shows a definite anamnestic response in immune animals, particularly if they were previously immunized by vaccination rather than by infection with virulent virus, and if the booster dose was given several months after the primary immunization.

Several British workers have suggested that there is more than one immunological type of canine distemper virus; however, the studies reported in America indicate that all strains are immunologically related to the egg adapted virus.

Data are presented which show that dogs can be passively protected against canine distemper, hepatitis and leptospirosis with either hyperimmune serum or immune globulin, and active immunity against these diseases may be established simultaneously by use of multiple doses of a combined inactivated vaccine. The average antibody titer of 24 puppies vaccinated with the inacti-

TABLE 5. The Antibody Response of Susceptible and Immune Dogs to the Individual or Combined Modified Live Viruses of Canine Distemper (CD) and Infectious Hepatitis (IH)

Group	No. Dogs	Prevaccination Titer: CD	Prevaccination Titer: IH	Vaccine	Postvaccination Titer: CD	Postvaccination Titer: IH
1	6	0	NT*	CD	1542	NT
2	9	NT	0	IH	NT	4224
3	12	0	0	CD&IH	1502	1916
4	4	NT	1245	CD	1575	NT
5	7	1374	0	IH	NT	1700
6	8	496	0	CD&IH	3281	1244
7	4	0	3433	CD&IH	658	16,130

*NT = Not Tested

vated virus vaccine for canine distemper was over 1,000 (per 0.1 cc. of serum against about 100 egg infectious doses of virus).

Additional data show that the modified live virus vaccines for canine distemper and infectious canine hepatitis, used either singly or in combination, will induce antibody response in susceptible puppies, or in those which are immune to one or the other or both of the diseases.

For puppies which are raised in a badly contaminated environment, a new immunization schedule is suggested. It consists of six weekly doses of about 1 cc. of inactivated vaccine, followed by a single dose of the modified living vaccine at about 12 weeks of age, and is based on the successful use of this program in several kennels, one of which was studied very closely.

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Tuberculosis of Dogs

Tuberculosis of dogs in the United States may not be receiving the clinical attention that it should be accorded, since the infection is intertransmissible between human beings and dogs. Dogs may be infected with any one of the various types of tuberculosis organisms, but the most common type of infection is the *Mycobacterium tuberculosis* type *hominis*. General clinical symptoms in dogs may be coughing, loss of appetite, fatigue, and reduced weight, in addition to dysentery when the digestive tract is involved. Bronchial, mediastinal and/or hepatic lymph nodes may be enlarged. Calcification does not appear often. Diagnosis, tentative of course, by chest *x*-ray is a recommended step. Opaque areas are evident, and fluid in the pleural cavities may be observed. The tuberculin temperature test does not, at this time, appear to have the degree of accuracy observed in cattle testing. The sedimentation test has also been used with questionable diagnostic value. It would appear at least that contacts between human beings and dogs should be carefully scrutinized when there is suspicion of tuberculosis.—*R. R. Dykstra, D.V.M.*

In this report, the third in a series on clinical application of resuscitative procedures, the writer reveals valuable information on the use of common nutrients such as table sugar and dried skimmed milk. Practical application of the scientific literature coupled with keen clinical judgment make this series a practical clinician's guide.

Clinical Aspects of Canine Nutrition

CHARLES E. BILD, D.V.M.

Miami, Florida

DURING MY YEARS of practicing small animal medicine and surgery, there have appeared new developments that are life-saving and time-saving. The professional literature mentions possible electrolyte combinations and uses, reaction-free blood transfusion equipment, antibiotics, vitamins, sulfonamides, insecticides, etc. Table sugar and dry skimmed milk[2] were available before I started practicing; however, only in the past few years have I learned how to put these products to good medical usage.

When we consider a clinical case in its entirety, the need of nutrients for resuscitation is of foremost importance. I have seen the use of table sugar, dry skimmed milk and vitamin supplement aid as many animals medically as any other one procedure.

Many of the ideas used in this paper came originally from an article by John Elliott, *et al.* entitled, "New Regimen in Feeding the Critically Ill" (*Am. Med. Assn. Archives of Surgery*, 64:278 [March] 1952); Dr. Paul Cannon's article, "Some Pathologic Consequences of Protein and Amino Acid Deficiencies"; Dr. Tom Spies' "Rehabilitation Through Better Nutrition"; and Dr. Clark W. Heath's "Anemia Due to Iron Deficiency" in *Symposium on the Blood*, a book published by the University of Wisconsin Press. I received the first idea of using table sugar from a chance remark by Dr. Mark Morris in 1948.

There is a need for table sugar, dry skimmed milk and a vitamin supplement in any dog that is off feed or partially off feed, or which is losing weight or hemoglobin level, or both. Indeed, such usage is beneficial in nearly every conceivable clinical situation.

Requirements for the convalescing animal are greater than for the normal animal, necessitating a high caloric intake with a high percentage of protein calories. The ideal would be at least 20% biologically available protein calories. Dry non-fat milk is approximately one half milk sugars and one-third protein.

The more uniform one can maintain the weight and hemoglobin or hematocrit level,

the better one can control a specific medical or surgical problem. Many operative cases in the over-all perspective are as much a problem in management of the nutritive intake as they are problems in surgery. In clinical application we advise that oral force-feeding be kept up until the animal is eating well three times daily for four days.

Hookworms and coccidia, in clinical practice, are rarely problems in parasitology. The therapeutics of the accompanying hookworm anemia and anthelmintic usage is quite minor. The hookworm problem is often a clinical one associated with prolonged nutritive deficits—usually protein and iron. Likewise, the clinical coccidia problem often reflects nutritive deficits, and the need of low residue feeding. Many cases of coccidiosis recover spontaneously and apparently develop an immunity. Often the time and trouble caused by the problem is in direct proportion to the clinician's attention to nutritive management and to use of a low residue diet.

Using a low-protein diet, or poor quality protein or both, when nephritis is shown by chronic albuminuria, is like using water in the crank case of an old automobile that leaks oil. Rehabilitation of such animals when possible, calls for constant consideration of the previous and often prolonged protein deficits. Table sugar and dry skimmed milk have many uses in this class of animals. In chronic and to some extent acute polyuria there may also be some abnormal waste of electrolytes.

The dog past middle age that has heartworms is often not a problem in parasitology. Many have chronic albuminuria, which may account for almost as many problems as the filaria infection. For this reason, the heartworm animal that has enjoyed excellent nutrition and care and no heartworm medication may live longer than a litter brother that has been treated three or four times.

The animal with several severe fractures that are successfully pinned often presents a problem that is as much medical as surgical. Of the medical factors, the most important is the nutritive intake—trying to overcome the nutritive deficits caused by the stress of the fractures and trauma. Hypothetically, if an animal had a previous need for 40 calories per pound daily, it could, in the early phase of the fracture period, have a catabolism of 100 calories per pound daily. Often the animal is only partly on feed; therefore it might consume 20 calories, making a deficit of 80 calories per pound daily. The over-all situation may be accurately followed by recording the body weight and accurate hemoglobin determinations.

Many times the problem of an immunity has no relationship with whether an animal has had a specific vaccination. In weight loss, or hemoglobin loss, or both, there may be concurrent loss of any degree of immunity.

Immunity or lack of immunity frequently is not a problem in bacteriology but rather a clinical problem directly related to protein intake and deficits. A dog known to be distemper immune may suffer extensive catabolism from traumatic injuries or from an infection such as leptospirosis. It may lose weight or hemoglobin level or both, and consequently lose the distemper immunity.

More than 1,700 cc. of 5% amino acid and 5% dextrose would be needed to equal in protein and calories the 12 level teaspoons per day of table sugar and the same amount of dry skimmed milk, plus the one-half ounce of Myeladol (Upjohn) and the 1 oz. of Lytren (Mead-Johnson) given in divided doses to a 20 pound dog. Besides, the oral routine would be more efficient by far. Actually, I have given this oral routine to dogs hundreds of times with no contraindications.

The following are case reports of animals that were given force-feedings of table sugar, dry skimmed milk and Myeladol without the use of the oral electrolyte. In retrospect, it appears that the use of oral electrolytes would have been advisable in each instance, through treatment was uniformly successful.

1. A one-year-old Poodle with hard pad disease was presented after refusing all nourishment for two weeks. The animal was kept at home and went 32 days without voluntarily taking nourishment except water. The weight and hemoglobin level was maintained by oral force-feeding. Practically no other therapy was used. This animal recovered and has been in excellent

health. For two years it has maintained weight and hemoglobin level, indicating good recovery.

2. A Fox Terrier with a 174 mg.% Blood Urea Nitrogen did not voluntarily take food for seven days. The owner maintained the dog on oral feedings 24 times daily for four days, 12 times daily for a week and then six times daily for ten days. A year later the hematocrit, weight level and hair coat of this dog were excellent, reliable evidences of good recovery.

3. A kitten with a severe diarrhea and elevated temperature was acquired from a pet shop. It was given antibiotics, fluid-electrolyte and B vitamins parenterally daily for four days. This kitten did not voluntarily take nourishment for ten days. The owner gave this kitten the table sugar and dry skimmed milk and Myeladol eight times daily for ten days. The cat has been in excellent condition for the past year.

Many times the young animal that is off feed, has elevated temperature and shows signs of impending distemper syndrome, has been placed on this routine for three or four days. I believe in these instances that the use of Lytren has always been of benefit. The early distemper syndrome suspect should be subjected to this routine if the individual is off feed. It is in order to start the oral force-feeding the second day the puppy is partially or completely off feed, and usually there is an elevated temperature.

Countless animals have been given oral force-feedings following surgical correction of endopyometritis and following severe trauma or stress situations. Lytren was used for four days in many of these cases. The dosage of table sugar and dry skimmed milk has always remained the same—a level teaspoon of each per 20 pounds of body weight. To increase a total daily dosage, the number of feedings has been increased, often practically around the clock. We always advise that force-feedings be continued until the animal is eating well for three or four days.

When oral feeding is continued, and when one is attempting to administer as many calories daily as possible without upsetting the animal, one may add a small amount of raw egg yolk or butter or both to the table sugar, dry skimmed milk, and vitamin supplement routine. The idea of adding the raw egg yolk came from the work of Dr. Ben Sheffy of Cornell University.

An important part of many medical and surgical problems is one's adeptness with oral resuscitative procedures. The literature tells us that protein deficits from stress situations represent loss of body essentials in somewhat the same proportion that they are essential to or are used by the body.

In the problem of resuscitation of the dog, pound for pound, and calorie for calorie, one day or ten days, the dog can be rehabilitated probably as well as man. The over-all resuscitative problem of the animal may be followed by recording the weight and hematocrit or hemoglobin level.

Summary

Any animal that is off feed or partially off feed, or any animal that is losing weight or hemoglobin level or both, can be benefited by the administration, eight to 12 times daily, of table sugar, dry skimmed milk and a vitamin supplement. The oral use of the protein dry skimmed milk appears to be biologically as efficient as amino acids. Dry skimmed milk and table sugar are inexpensive and can always be administered by the client at home. In the first two to four days of this procedure, an oral electrolyte such as Lytren is definitely beneficial.

External Otitis

Many cases of external otitis in the dog and cat may be treated simply and effectively with a mixture of one part thymol iodide to seven parts of zinc oxide ointment. Two to four parts of any of the antibiotic ointments added to the mixture will take care of infection, evidenced by purulent. discharge, if it is also present.—*Atlas Newsletter, Small Animal Digest.*

OXYGEN SUPPLY A

ALEXANDER R. EVANS, V.M.D.
JOSEPH M. STOYAK, V.M.D.

BELOW

Fig. 1. Hose coming from ceiling outlet (right), completely out of the way, presents no obstacle to surgical work. Dog being intubated will receive ether-oxygen mixture through the AVR unit on the operating table.

RIGHT

Fig. 2. Two banks (two cylinders each) of cylinders furnishes the supply of oxygen for the piping system. One bank supplies the gas until its pressure has dropped to a certain level. At this point, a valve in the manifold automatically switches to the other bank, and an alarm sounds (top center) to signal the need for replacing the empty cylinders. Thus, the system assures the constant availability of oxygen. A vacuum pump (right) furnishes suction, which is also piped to the surgical wing.

LY ASSURED

WITH PIPING SYSTEM

The recently constructed surgical wing at Rowley Memorial Animal Hospital, one of the two animal hospitals operated by the Massachusetts S.P.C.A., contains piping systems for oxygen and vacuum to provide easy and ready availablility for both these services. Oxygen use is being regarded as more and more important during anesthetic administration, and indications for the need of oxygen therapy during surgical recovery are growing. In addition, an increasing number of medical cases are also being treated with oxygen and oxygen-aerosol mixtures.

Current use of oxygen in veterinary surgery and medicine is generally acknowledged to be at a level below actual requirements. The basic reason for inadequate oxygen administration in animal hospitals up to now has been the inconvenience and difficulty of getting the gas to the patient, especially with the acute shortage of labor and convenient administration equipment in these hospitals. A piping system does away with this problem by providing oxygen exactly where it is needed, just as an electric wall outlet provides current at the insertion of a plug. Combined with recently developed administration equipment, such as a specialized animal anesthetic unit and an oxygen therapy cage, the piping system has made oxygen administration relatively simple at Rowley.

Recent Rowley figures bear out the fact that making oxygen administration easy through a piping system produces the desirable therapy, and shortens the patient's hospital stay. Also, through new technics and new equipment, we have been able to provide better patient care. The results have been gratifying, with more and more patients receiving the benefits of proper anesthesia and oxygen therapy.

Ceiling Outlets

The operating room contains one double ceiling outlet—providing oxygen and vacuum service — plus an additional ceiling outlet for oxygen. The recovery room has a double ceiling outlet for vacuum and oxygen, in addition to a wall-mounted oxygen outlet. Use of ceiling outlets eliminates the need for hose-support cranes and does away with the hazard of operating room personnel becoming entangled in a hose leading from a wall outlet to the anesthesia or inhalation therapy equipment (figure 1).

Outlets have a self-sealing mechanism housed in an "electrical-outlet" type of box, which requires no dust cap, springs or trap doors. A hose adapter is inserted into the ceiling outlet and held in place by a knurled nut which is screwed on a threaded projection on the outlet to prevent accidental disconnection. When the adapter is inserted a poppet within the outlet moves upward to open the valve mechanism. Withdrawing the adapter automatically closes the outlet valve and stops the flow of gas. Hoses, connected to adapters in each outlet, terminate at least five feet above the floor to conform with National Fire Protection Association regulations. When oxygen or vacuum is required, a safety-keyed adapter is inserted into a check-unit on the hose. This action opens a valve in the check-unit and allows the vacuum or oxygen to flow to the point of use. An adapter at the end of the hose connects the service to the desired equipment.

Automatic Switch

The complete oxygen and vacuum piping system was installed at a cost of $1,500. The piping equipment including the mani-

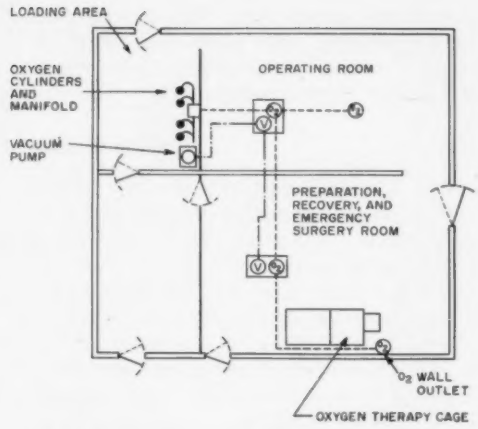
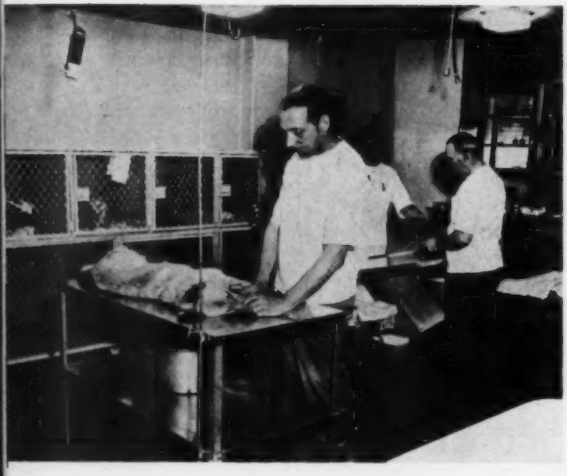


Fig. 3. Diagram of oxygen (dashes) and vacuum (dots and dashes) piping system at Rowley Memorial Animal Hospital. Piping is run through the ceiling and services are furnished through flush-mounted ceiling outlets.

fold, vacuum pump, alarm, and outlets cost about $500; the rest of the equipment including an AVR unit for administering anesthetic and/or oxygen and a cooling and circulating oxygen tent cost approximately $500; and the plumbing costs were approximately $500. Designer of the system and supplier of piping and administration equipment was National Cylinder Gas, Division of Chemetron Corporation. The oxygen supply is furnished by two banks of oxygen cylinders, with two cylinders per bank (figure 2). When the pressure of the bank in use goes down to a certain level, there is an automatic switch to the bank of full cylinders. As this automatic action occurs, an audible alarm sounds and a warning light goes on. The empty cylinders are then disconnected and replaced with full cylinders. As a result, the system assures the availabliity of oxygen at all times.

The system utilizes ¼ in. seamless copper tubing (type K) to carry oxygen and vacuum throughout the system. Vacuum is provided by a special type pump.

Fig. 4. The preparation-recovery room contains a double outlet for both oxygen and suction (upper right) and a wall outlet for oxygen (left), which supplies gas to the oxygen therapy cage adjacent to it via an iced oxygen tent.



Piped System

Used in conjunction with the oxygen piping system is an AVR unit which provides either anesthetization or resuscitation. The oxygen piping system has encouraged the use of the AVR because there is no need to move cylinders from room to room. The AVR unit is operatable by one man; the surgeon uses a sterile sponge to handle the controls on the AVR unit.

The wall outlet in the recovery room is attached to an oxygen therapy cage (figure 4). This cage, which measures 36 x 36 x 30 inches, has a Plexiglas cover over the wire. Holes in the bottom of the cage are used to evacuate excessive carbon dioxide. The oxygen entering the cage is cooled by ice in a small stainless steel tent. The tent can maintain a temperature of approximately 74 F. in the cage under normal conditions. With six liters per minute of oxygen flow, a concentration of approximately 40% is maintained within the cage.

We can feel safe in leaving an animal under oxygen therapy, even when no members of the staff are in direct attendance. This installation of piped oxygen and vacuum system is a significant step in helping to bring veterinary surgical technics up to date.

Further studies are now in progress regarding the increased use of these facilities as outlined above and we hope to expand and more clearly define the limits of its use both in surgery and medical inhalation therapy in the field of veterinary medicine.

Here each month are published ideas, suggestions and comments picked up by VM reporters.

Small Animal Clinic

X-Radiation

The New Jersey State Department of Health has recently issued a report of a limited survey conducted on *x*-radiation exposure in the practice of veterinary medicine. The Department summarizes some of its recommendations as follows:

1. Always wear a leaded apron, and if the hands are likely to be exposed also wear leaded gloves.
2. Anesthetize patients to keep them quiet during radiography and thus avoid the necessity of hand exposure.
3. Restrict radiation to the lowest practical level — dark adaption of the operator's eyes will aid screen image visibility.
4. House the *x*-ray tube in a shielded cabinet for fluoroscopy.
5. Provide a leaded rubber curtain extending from table top on the side where the viewer stands.
6. Always use a cone or diaphragm in order to restrict the beam to the film size used.
7. Never hold an animal with naked hands so that these are in the direct beam.
8. Provide a 1 mm. aluminum external filter for all *x*-ray tubes.
9. Push the *x*-ray tube down flush with the table surface to the shielded fluoroscopy that will give a one-quarter inch unilluminated area around the entire periphery of the screen, and fix the motion of the screen to the tube so that removal of the screen from the direct beam is prevented.

A significant statement in the report is that "all ionizing radiation produces tissue destruction; some of this destruction is irreversible."

It quotes the National Committee of Radiation that a maximum permissible radiation dose for those occupationally exposed is 300 mr. per week for whole body irradiation, and 1,500 mr. per week for irradiation of the hands alone. The report also advised wearing of personnel-monitoring film badges for those frequently resorting to *x*-radiation and having it analyzed at weekly intervals as a safety precaution. There is no certainty at this time in what manner or to what extent the genetic effects of radiation can or will transmute the progeny of exposed persons or their offspring in turn. The "hand-fluoroscope" is designated a "murderous device."

Versatile Dixie Cup

The Dixie Cup can serve as anesthesia mask for parakeet tumorectomies performed in a veterinary hospital. Cup holds a small

Dixie Cup

swab of ether-soaked cotton. Veterinarians report that about one out of five parakeets develop tumors.

The incidence of Staphylococcus aureus, coagulase positive, in umbilical stumps is over 80% by the fourth day of life, according to Brooke Army Hospital investigations. Phage types generally considered pathogenic were found in 30% of 144 infants. However, 132 of the patients were re-examined at one month of age. Only two exhibited signs of skin disease.—*Modern Medicine, May 15, 1959.*

A broad spectrum anthelmintic effective against four major parasitic diseases was described at a meeting of the Kentucky Academy of General Practice.

The compound, dithiazanine (Dizan — Corn States), has been tested in more than 2,000 patients and has proved effective in treating trichuriasis, ascariasis, strongyloidiasis and enterobiasis. Follow-up studies on more than 1,000 of these patients revealed over 95% cure-rate within five days of therapy. Since the drug is not absorbed from the gastrointestinal tract, it can be safely used in pregnant women and debilitated patients. Chief side effects have been nausea and vomiting and occasional diarrhea, but nothing serious enough to warrant discontinuance of therapy.—*Medical News, June 10, 1959.*

A complication of extensive radiotherapy is a membranous mouth lesion resulting from an overgrowth of *Candida albicans.* Treatment of this thrush-like condition is best accomplished with 1 to 2 cc. of Mycostatin placed in the mouth and held as long as possible before swallowing. Administration is repeated four times daily.—*Radiology, 72:26, 1959.*

A satisfactory method of freezing whole blood has been developed by Strumia and co-workers. Acid-citrated blood is modified by addition of an equal part of a solution containing lactose and dextrose. The mixture is frozen quickly in flat thin aluminum containers by immersion in a carbon dioxide-ethanol mixture. Thawing is accomplished in a water bath at 37 C. Erythrocytes have an *in vivo* survival time equivalent to fresh autotransfusion. If frozen blood is to be stored for an appreciable period, temperature has an important influence. At —93 C., a satisfactory recovery and survival of erythrocytes is maintained for at least six months.—*Science, 128:1002, 1958.*

Topical ocular therapy currently includes antibiotics, local anesthetics and adrenal cortical steroids. Drops rather than ointment are recommended for administration of antibiotics. Drops should be instilled at hourly intervals or even more often. Therapy should be continued at least three days after the conjunctival infection appears to have subsided. Chloramphenicol has the widest spectrum of activity and readily penetrates the cornea, thereby enhancing its value in various forms of keratitis and intraocular infections. Antibiotics are valuable also for the prevention of infection after injury to the cornea.

Local anesthetics should be used sparingly in eye diseases. For example, tetracaine hydrochloride is useful when a foreign body is to be removed. However, the anesthetic should not be used afterward because it impedes corneal healing. Pain can be relieved by systemic administration of an analgesic agent.

When the cornea is irritated, the pupil tends to constrict. This should be overcome by local instillation of 2% solution of homatropine hydrobromide, or 0.2% solution of scopolamine hydrobromide.

Steroid hormones have been used topically in a variety of eye diseases. They are rarely indicated and are definitely contraindicated in all corneal abrasions, corneal ulcers, keratitis, fungus infections where foreign bodies are present, and especially in any ocular condition where there is an element of doubt as to cause.—*Armed Forces Med. Jour., 10:161, 1959.*

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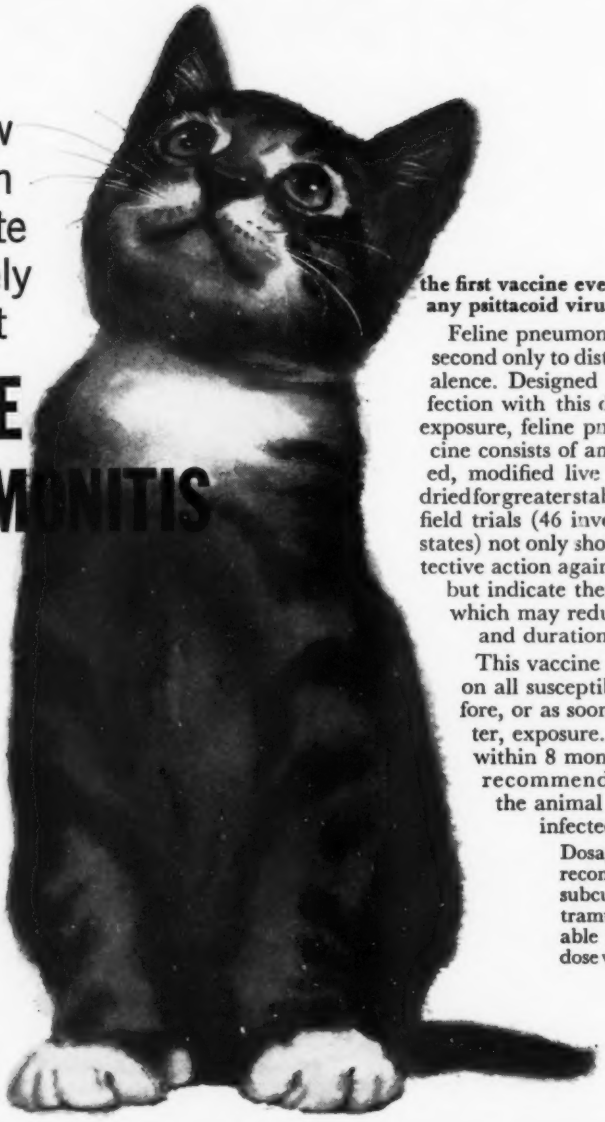

the first vaccine ever developed for any psittacoid virus disease

Feline pneumonitis is a disease second only to distemper in prevalence. Designed to prevent infection with this disease prior to exposure, feline pneumonitis vaccine consists of an egg-propagated, modified live virus, vacuum dried for greater stability. Extensive field trials (46 investigators in 13 states) not only show a highly protective action against pneumonitis but indicate therapeutic effects which may reduce the severity and duration of the disease.

This vaccine should be used on all susceptible animals before, or as soon as possible after, exposure. Revaccination within 8 months to a year is recommended whenever the animal is placed in an infected environment.

Dosage is 1 cc. of the reconstituted vaccine, subcutaneously or intramuscularly. Available in 1 or 5 single dose vials with diluent.

(Bio. 804)

extensive field trials show 86% of cats protected by vaccine			
No. of cats	Status	No. of cats remaining well	No. of cats developing symptoms
1462	vaccinated	1254 (86%)	208 (14%)
809	controls	483 (60%)	326 (40%)
field use in noninfected cats			

therapeutic effects also indicated			
No. of cats	Status	No. of cats recovering in 5 days	No. of cats remaining sick after 5 days
611	treated	449 (74%)	162 (26%)
379	controls	66 (17%)	313 (83%)
field use in infected cats			

PITMAN-MOORE COMPANY Division, **ALLIED LABORATORIES, INC.**, Indianapolis, Indiana

Controlled studies reported here indicate that 0.0165% nitrofurazone in the feed of lambs resulted in better weight gains, better carcass quality and less morbidity than lower levels or no medication. Absolute immunity to coccidia reproduction did not occur following challenge.

Experimentally Induced Ovine Coccidiosis

I. USE OF NITROFURAZONE IN THE FEED

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North Dakota Agricultural Experiment Station
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TREATMENT OF OVINE COCCIDIOSIS with nitrofurazone has been reported on several occasions.[1,2] As the disease occurs more frequently under feedlot conditions, preventive measures such as including a coccidiostat in the feed seem plausible. This experiment was designed to determine whether the inclusion of various levels of nitrofurazone in the feed had an effect on experimentally induced coccidiosis in lambs. Observations of the course of the disease as produced by mixed infections as well as the immunity produced against each species of coccidia were made.

Materials and Methods

A total of 136 lambs, purchased from a southwestern North Dakota range flock, were weighed, graded, and checked for coccidia by a fecal flotation method. All lambs were negative for coccidia oocysts. The four best and four poorest wethers and the four best and four poorest ewe lambs, as determined by weight and grade, were eliminated from the experiment and were experimentally infected with coccidia to insure an adequate supply of oocysts. The remaining 120 lambs, averaging about 70 lb. each, were randomly distributed to twelve lots so that five wethers and five ewe lambs were in each lot. All lambs were given a therapeutic drench of phenothiazine. This was followed by a four day holding period before the experiment was initiated.

The basic feed for all lots consisted of a pelleted preparation containing 49% ground alfalfa, 40% ground yellow corn, 10% molasses, and 1% trace mineralized salt. To this was added 4 lb. of phenothiazine per ton of feed. The appropriate levels of nitrofurazone were incorporated as the feed was mixed. All lambs had been vaccinated against sore mouth and enterotoxemia.

The lambs were housed on concrete slabs; half of the slab was sheltered by a roof, the other was open. Pens were constructed to eliminate possible contamination from one pen to the other, and cleaned twice daily. Treatment lots were replicated once and were designated as follows:

Lots 1a and 1b—uninfected, no drug.

Lots 2a and 2b—uninfected, 0.0165% nitrofurazone in feed.

The author is presently at Agriculture Research Center, Eli Lilly and Company, Greenfield, Indiana.

Lots 3a and 3b — infected, no drug.

Lots 4a and 4b — infected, 0.0165% nitrofurazone in feed.

Lots 5a and 5b — infected, 0.011% nitrofurazone in feed.

Lots 6a and 6b — infected, 0.0055% nitrofurazone in feed.

Drug was administered in the feed for 21 days after which all lots were given the same ration. On the day that the experimental feed was first fed to the lambs, approximately the following number of sporulated oocysts were added daily for five consecutive days to the feed of each of the lots to be infected:

Eimeria arloingi	410,000
E. ninae-kohl yakimovae	380,000
E. intricata	68,000
E. parva	57,000
E. pallida	29,000
E. faurei	38,000
E. granulosa	18,000

Individual weights were taken weekly. Fecal oocyst counts were made from the 12th to the 30th day following infection. On the 35th day all lambs of replicate "a" of each treatment group were drenched with sporulated occysts; on the 42nd day all lambs of replicate "b" were also drenched with oocysts. Approximately the following numbers of sporulated oocysts were given each lamb:

E. arloingi	2,050,000
E. ninae-kohl yakimovae	1,900,000
E. intricata	340,000
E. parva	285,000
E. pallida	145,000
E. faurei	190,000
E. granulosa	90,000

Immunity to the challenge dose was determined by weight change and oocyst counts. Surviving lambs were live graded, slaughtered at 65 days, and carcass grades were obtained. Feed consumptions were recorded throughout the experiment.

Results

The first clinical sign of coccidiosis was scouring. Dark brown feces approaching black with occasional flecks of blood were noted from the 13th day to the 25th day in all infected lots. Accompanying this was a lack of feed consumption with resultant weight loss. Intake was least from 17 to 20 days following infection. Improved consumption occurred after this period and was equal to that of the noninfected animals by the 38th day. Table 1 depicts the weight changes and feed consumptions that occurred during initial and challenge infec-

TABLE 1. Feed Consumptions and Weight Changes

Lots	Initial Infection Days 3-37		Following Challenge Days 38-64	
	Weight Change (lb.)	Feed Consumed (lb.)	Weight Change (lb.)	Feed Consumed (lb.)
1a Uninf. No Drug	116	859	-1	510
1b Uninf. No Drug	87	797	6	648
2a Uninf. 0.0165% NFZ	124	836	-5	502
2b Uninf. 0.0165% NFZ	71	829	67	639
3a Inf. No Drug	-13	468	165	708
3b Inf. No Drug	74	686	92	698
4a Inf. 0.0165% NFZ	33	636	160	727
4b Inf. 0.0165% NFZ	44	559	145	697
5a Inf. 0.011% NFZ	-13	559	141	648
5b Inf. 0.011% NFZ	25	559	142	697
6a Inf. 0.0055% NFZ	-128	521	127	594
6b Inf. 0.0055% NFZ	-7	553	145	704

TABLE 2. Feed Conversions for the 64 Day Experimental Period Including Initial and Challenge Infections

Lot and Treatment*	Lb. Gained/lb. Consumed
1a Uninfected—no drug	.0840
1b Uninfected—no drug	.0636
2a Uninfected—0.0165% NFZ	.0889
2b Uninfected—0.0165% NFZ	.0940
3a Infected—no drug	.1292
3b Infected—no drug	.1272
4a Infected—0.0165% NFZ	.1416
4b Infected—0.0165% NFZ	.1505
5a Infected—0.011% NFZ	.1060
5b Infected—0.011% NFZ	.1289
6a Infected—0.0055% NFZ	—
6b Infected—0.0055% NFZ	.1098

*All treatments followed by challenge at 35 days

TABLE 3. Converted Slaughter Carcass Grades

Lots	Converted Grades*
1a Uninfected—no drug	34
1b Uninfected—no drug	30
2a Uninfected—0.0165% NFZ	32
2b Uninfected—0.0165% NFZ	32
3a Infected—no drug	26
3b Infected—no drug	30
4a Infected—0.0165% NFZ	36
4b Infected—0.0165% NFZ	32
5a Infected—0.011% NFZ	35
5b Infected—0.011% NFZ	34
6a Infected—0.0055% NFZ	20
6b Infected—0.0055% NFZ	21

*Choice = 5, Good = 3, Utility = 1, Cull = 0

tions. It is evident that weight gains and initial feed consumptions were severely impaired by the initial infection. This also occurred in treatment groups one and two following challenge, indicating that these groups were successfully kept free of coccidia during the initial infection period. Treatment group 4 which received 0.0165% nitrofurazone in the feed seemed to withstand both the initial and challenge infections on the basis of weight gain and feed consumption. This is seen more clearly in the feed conversion efficiency depicted in table 2.

No significant differences in weight gain or feed consumption occurred between treatment groups 1 and 2 during the initial infection, indicating that the addition of 0.0165% nitrofurazone to the feed did not interfere with these functions.

One lamb in lot 5a (0.011% NFZ) died on the 39th day. Two lambs in lot 6a (0.0055% NFZ) died on the 29th and 34th days respectively. All three deaths were attributed to the effects of coccidiosis; however, secondary infections were present in all three. No mortality occurred that was attributed to the challenge infection although treatments 1 and 2 scoured profusely. Some sporadic scouring was noted in the other lots but was never severe.

Table 3 summarizes the converted carcass grades at slaughter. Based on these data, treatment with 0.0165% or 0.011% nitrofurazone for 21 days in the feed seemed to

TABLE 4. Average Number of Oocysts (Per Gram of Feces) Per Lamb

	Initial Infection—Oocysts x 1000								
Days After 1st Day of Exposure*	14/15	16/17	18/19	20/21	22/23	24/25	26/27	28/29	30
Treatment									
Infected—no drug									
3a	57.2	7.6	16.0	407.1	215.7	317.8	12.8	20.0	6.4
3b	30.8	31.5	943.6	129.7	73.6	84.0	27.4	10.5	
Inf.—0.0165% NFZ									
4a	Pos.**	126.7	20.1	15.0	38.7	28.3	431.0	19.8	9.6
4b	12.2	4.6	24.3	4.7	834.0	271.2	35.5	18.4	
Inf.—0.011% NFZ									
5a	Neg.	45.4	17.0	51.3	30.9	334.6	20.8	24.0	19.3
5b	19.8	697.0	n.s.***	112.7	13.7	11.9	15.2	8.1	
Inf.—0.0055% NFZ									
6a	Pos.	22.9	39.8	40.3	59.2	41.3	52.0	33.3	19.8
6b	14.1	Pos.	52.1	48.6	20.1	67.3	15.4	16.4	

* Counts of lambs in replicate 'a' were made on even numbered days, those for 'b' on odd numbered days
** Positive on flotation but less than 800 oocysts per gram of feces
***No samples available

result in better carcasses than the non-treated, infected group.[3]

Oocyst counts, expressed as the average number of oocysts per gram of feces per lamb, are depicted in table 4. Fewer oocysts seem to have been produced from the lambs receiving 0.0055% nitrofurazone in the feed. This may be due to sample technique, however, since samples from each animal were taken every other day, making it possible to miss large "showers" of oocysts in the feces. *Eimeria ninae-kohl yakimovae* oocysts accounted for approximately 60% of the oocysts produced; about 25% were *E. arloingi;* 7% were *E. intricata;* 8% were identified as being either *E. parva* or *E. pallida;* less than 1% were *E. faurei.* Oocysts identified as *E. granulosa* were found on two occasions, the total number being less than .01% of the total number of oocysts counted.

Oocyst counts following challenge infections are summarized in table 5.

The two treatment groups that served as uninfected — untreated, and uninfected — treated controls for the initial infection produced large numbers of oocysts, but not as numerous as those eliminated from the lambs of the other treatments during the course of the original infection. This may have been due to the different methods of administration of the sporulated oocysts as well as the acquisition of a certain degree of age resistance. Over 80% of all oocysts produced in these treatment groups were *E. ninae-kohl yakimovae;* approximately 15% were *E. arloingi;* approximately 4% were identified as *E. parva* and *E. pallida;* less than 1% were *E. intricata.* No *E. granulosa* or *E. faurei* were observed.

Small numbers of oocysts were passed from the previously infected groups. All species given at challenge were present except *E. granulosa.* This indicates that complete immunity did not occur in any of the previously infected groups. Lambs of lot 5a which had received 0.001% nitrofurazone in the feed for 21 days during the initial infection produced the largest number of oocysts of the previously infected groups. Over 50% of these oocysts were *E. arloingi.* This lot consumed an average of 59 milligrams of nitrofurazone per lamb per day for the 21 day treatment period; on the same basis lot 4a consumed 106 milligrams; lot 4b, 88 milligrams; lot 5b, 70 milligrams; lot 6a, 33 milligrams; and lot 6b, 36 milligrams. It does not seem plausible that the drug prevented the establishment of immunity to any of the species since the infected untreated group (3a and 3b) also produced oocysts upon challenge.

TABLE 5. Average Number of Oocysts (Per Gram of Feces) Per Lamb

Days After Challenge Dose	Challenge Infection—Oocysts x 1000							
	14/15	16/17	18/19	20/21	22/23	24/25	26/27	28/29
Treatment*								
Uninf.—no drug								
1a	Neg.	Neg.	192.1	172.1	354.8	29.5	79.2	2.9
1b	Neg.	78.5	72.1	326.7	—	—	—	—
Uninf.—0.0165% NFZ								
2a	Neg.	Pos.	35.0	233.8	126.4	00.2	54.3	1.3
2b	Pos.	23.6	26.0	47.9	—	—	—	—
Inf.—no drug								
3a	8.0	0.7	4.3	1.4	0.4	0.7	Neg.	Neg.
3b	0.5	0.9	0.4	Neg.	—	—	—	—
Inf.—0.0165% NFZ								
4a	9.2	2.3	Neg.	Neg.	0.9	0.2	Neg.	Neg.
4b	Neg.	Neg.	0.1	0.2	—	—	—	—
Inf.—0.011% NFZ								
5a	11.4	17.6	11.8	4.1	7.1	Neg.	0.4	Neg.
5b	0.7	0.4	Neg.	Neg.	—	—	—	—
Inf.—0.0055% NFZ								
6a	Neg.	1.1	0.6	Neg.	0.3	0.1	2.9	0.6
6b	0.5	Neg.	0.2	Neg.	—	—	—	—

*Treatments refer to those used in the first 21 days of the trial. All lambs were administered oocysts as a challenge, all were fed a ration without drug.

Summary and Conclusions

A total of 120 coccidia free lambs were placed in 12 lots on the basis of sex and weight so that five ewe lambs and five wethers were in each lot. Six treatment groups, replicated once, consisted of uninfected-untreated, uninfected-treated (0.0165% nitrofurazone in feed), infected-untreated, and three infected-treated groups which received 0.0165%, 0.011%, and 0.0055% nitrofurazone in their feed respectively. All groups designated to be infected were given sporulated oocysts of seven species of ovine coccidia in their feed for five consecutive days. Treatment in the feed was begun on the first day of exposure to the oocysts and continued for 21 days. Thirty-five days following the initial exposure of four of the treatment group to oocysts, all six groups were drenched with five times the original number of oocysts as a challenge.

From the data collected it appeared that the inclusion of 0.0165% nitrofurazone in the feed resulted in better weight gains, better carcass quality, and less morbidity than treatments of 0.011% or 0.0055% nitrofurazone in the feed or no nitrofurazone in the feed. Evidenced by oocyst production following challenge, no absolute immunity to coccidia reproduction occurred in any of the groups.

Acknowledgment

The author gratefully acknowledges the technical assistance of Messrs. A. Decoteau, C. Myers, B. Espe and J. Hegreberg. This research was supported by a grant-in-aid from Eaton Laboratories, Norwich Pharmacal Co., Norwich, New York. It has been published with the approval of the Director of the North Dakota Agricultural Experiment Station, Fargo, North Dakota.

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Integration of Hog Production

The invasion of pork production by contract farming stirred up the greatest controversy ever to involve the red meat industry over a year ago. The typical corn-hog farmers took to vertical integration with something less than enthusiasm. Since the initial move came from meat packers, cooperatives are almost certain to balance that move with some of their own.

Increased activity in swine integration will be evident as moves for a uniform supply of meat-type hogs come into play. Less favorable hog prices will quite likely stimulate farmer acceptance of integrated production, according to a report by *Doane Digest*.

The southern great plains, the southeast and the middle Atlantic area — all are showing interest in development of confinement hog raising systems and filling needs of packers in their geographical areas.

Heat and Femur Growth

It has been demonstrated experimentally that local heat enhances rate of bone growth, according to a report by two Stanford University School of Medicine investigators. Clinical trial for the new technic in small animal medicine may be indicated. Preliminary investigations proved that the new technic stimulated bone growth in both young dogs and rats when applied prior to epiphysial closing.

The method involves wrapping metal wire around the distal end of the femur. Wire ends are passed subcutaneously to the dorsum, then out through the dorsal skin to terminals set on the back of the animal. Alternating current (1.1 volt) supplies the energy. During heating — 25 to 94 hours — the bone temperature in the intramedullary canal increased (1.5:2 C), but no systemic temperature was noted. — *Medical News, February 25, 1959.*

Dwarf Bulls

A Study of Certain Endocrine Glands from Two "Sterile" Hereford Dwarf Bulls

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Department of Veterinary Science
and Department of Animal Husbandry
Fargo, North Dakota

THIS REPORT records the findings on two snorter dwarf Hereford bulls from the herd of North Dakota Agricultural College. Both bulls, ET6-8 and ET110, had displayed no interest in the opposite sex at the time of castration. Castration was performed when bull ET6-8 and bull ET110 were 2½ and 3½ years of age respectively. The bulls were sacrificed four months after castration. The testes, adrenal glands and pituitary glands were saved for histological examination.

Madsen *et al.*[9] observed cystic pituitary glands in young cattle with vitamin A deficiency. Previous studies of dwarfism in cattle have revealed cystic pituitary and adrenal glands.[3,9] Gilmore et. al.[4] observed the normal histology of the bovine pituitary gland and established the percentages of acidophiles, basophiles and chromophobes in the anterior lobe. Ellison and Wolfe[2] observed a collodial material in the residual cleft of approximately one-third of the castrate rats they examined. Johnson et. al. reported the reduction of spermatogenesis in the testes of dwarf Hereford bulls.[5] Leuchtenberger et. al.[7] and Leuchtenberger and Schrader[6] recorded a case in which the testes of a "sterile" dwarf Hereford bull showed no spermatids and no sperm. Hypertrophy of the adrenal glands following castration has been reviewed by Soffer.[9]

Observations and Discussion

The testes of the two animals showed normal interstitial tissue. There were no sperm and no spermatids in the testes of bull ET6-8 (fig. 1) but bull ET110 exhibited spermatids throughout the testes and only scattered groups of sperm. The sperm appeared immature.

The study of representative sections at varying levels from both adrenal glands of each animal revealed a type of arterial degeneration in both. Further study of this condition is being pursued. The capsule of the left adrenal gland of bull ET6-8 possessed islands of adrenal cortical tissue indicating nodular hyperplasia (1). Adrenal cysts as cited by previous authors[3,8] were not observed.

The pituitary glands were abnormal in both cases. A type of arterial degeneration was observed in all areas of the pituitary glands from both animals. This and the arterial degeneration in adrenal glands is being studied further. Cell counts were made to determine the percentages of acidophiles, basophiles and chromophobes in the anterior lobes. These percentages fell within the standard of deviations for each of these cell-types as shown in the work of Gilmore et. al.[4] on 20 bulls and two castrates from several breeds. The hypophyseal or residual cleft in ET110 was extremely enlarged and filled with a colloidal material that was stained with eosin. The pars intermedia of

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each animal was found to be connected to the pars nervosa by means of a large transitional zone which occupied the area normally held by the pars nervosa (fig. 2). This condition is most pronounced in bull ET110. In this case only a minute trace of the original septum between the pars nervosa and the pars intermedia remains; the transitional area is so engulfing that only small islands of distinct pars nervosa remain. In both cases the transitional area is similar to that of the pars intermedia except that: (1) acidophiles do not occur; (2) the original extra-cellular base of the pars intermedia remains; and (3) there is a faint development of an envelope or capsule in the form of two to three layers around the remnants of the pars nervosa.

Summary

The testes of these "sterile" bulls showed histological structures that are in agreement with the fact that neither one had been interested in sex. The abnormal histology of the pituitary glands, the vessels in the adrenal glands and the capsule of each adrenal gland may be an expression of dwarfism in Hereford cattle; or, these tissue changes may be the effect of castration or some other factor.

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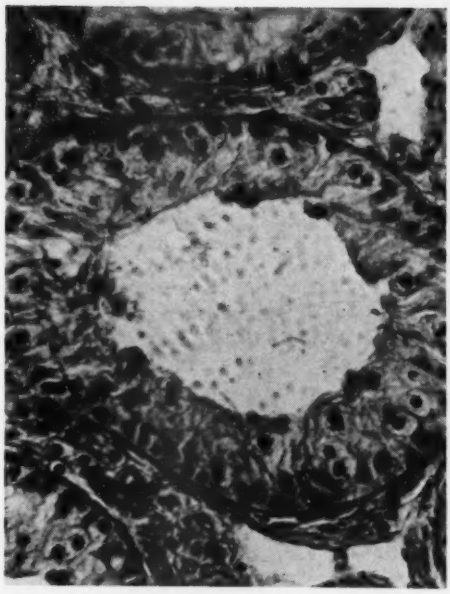
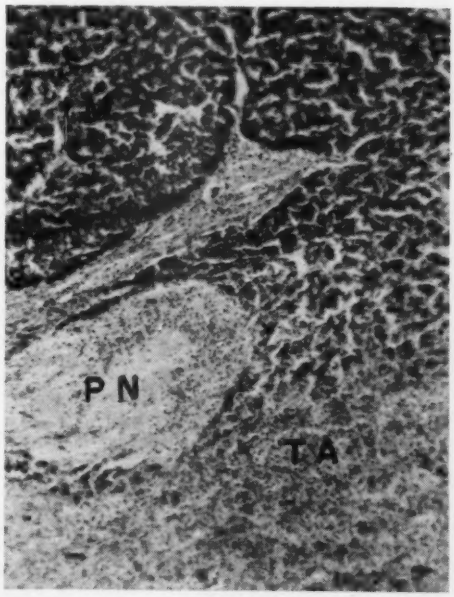


Fig. 1. Photomicrograph; typical region of testis of bull ET6-8; 6 microns; 50 magnifications.

Fig. 2. Photomicrograph; typical sagittal section of pituitary gland of bull ET110; 6 microns; 50 magnifications. Legend: IM-Intermediate lobe; PN-pars nervosa; TA-transitional area between pars intermedia and pars nervosa.



Neoplasms of Animals in India

AN ACCOUNT OF NEOPLASMS COLLECTED IN 12 YEARS

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Andhra Veterinary College

Tirupathi, India

FROM THE NEOPLASMS received at the Madras Veterinary College from 1940 to 1951, Chandrasekharan Nair and Sastry listed 2,000 bovine neoplasms in 1954. This report is a continuation of that study and lists tumors found in other animals. Diagnosis was made by histopathological examination. It is not possible to adequately estimate the population of the various species involved in this study.

Canine Tumors

A total of 325 tumors from dogs were received during a 12 year period (see table 1).

The age incidence of different kinds of tumors is presented in table 2.

From table 2 it develops that the highest incidence of tumors occurs within the group from two to six years of age.

TABLE 1

Kind of Tumor	Number Received	% of Total
Venereal tumor of dogs	194	60.0
Round cell sarcoma	17	5.2
Fibroma	6	2.0
Fibrosarcoma	2	0.6
Lipoma & liposarcoma	4	1.2
Lymphosarcoma	7	2.1
Melanotic tumors	5	1.5
Liomyoma	1	0.3
Fibroliomyoma	3	1.0
Angioma	2	0.6
Neurofibroma	1	0.3
Histiocytic sarcoma	1	0.3
Sebaceous adenoma	1	0.3
Squamous-cell carcinoma	23	0.7
Papilloma	24	7.4
Adenoma	9	2.7
Adenocarcinoma	11	3.4
Adenofibrochondroma	12	3.7
Endothelioma	2	0.6

TABLE 2
Age Incidence of the Canine Tumors

Kind of Tumor	Under 1 yr.	1	2	3	4	5	6 years	7	8	9	10	11	12	13	Over 13 yr.	Total
Squamous cell carcinoma	1	1	1	1	2	—	1	—	2	—	—	1	—	—	—	10
Adeno-carcinoma	—	—	1	—	1	—	—	2	—	3	—	—	—	1	2	10
Sebaceous gland tumor	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Papilloma.	1	2	6	2	1	—	1	—	—	—	—	—	—	—	—	13
Adenoma.	—	—	1	1	1	—	—	—	—	1	—	—	—	—	—	4
Mammary mixed tumor	—	—	2	3	1	2	—	2	—	—	—	—	—	—	—	10
Venereal sarcoma. Males	—	1	16	13	9	5	4	1	1	—	1	—	1	—	3	55
Females	2	4	24	24	12	8	1	—	1	—	—	—	—	—	1	77
Lipoblastoma.	—	—	1	—	—	—	2	—	—	—	—	—	—	—	—	3
Lymphosarcoma.	—	—	—	—	—	—	1	—	—	—	—	—	—	—	2	3
Melanoblastoma.	—	—	—	2	—	—	1	—	—	—	—	—	—	—	1	4
Fibroliomyoma.	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	2
Angioma.	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	2
Neurofibroma.	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
Histiocytic sarcoma.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Endothelioma.	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1
Liomyoma.	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
Fibrosarcoma.	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
Fibroma.	—	—	—	2	—	—	1	—	—	—	—	—	1	—	—	4
Basal cell carcinoma	—	—	—	1	—	—	3	—	—	—	—	—	—	—	1	5
Total	4	8	52	51	31	16	15	6	4	4	1	1	2	1	10	206

Equine Tumors

Of the 38 equine tumors reported, 35 were in horses and three in asses (table 3).

TABLE 3

Type of Neoplasm	Number	Per-centage
Fibroma	6	17.14
Fibrosarcoma	2	5.71
Melanoma	2	5.71
Neurofibroma	1	2.88
Papilloma	2	5.71
Basal cell carcinoma	2	5.71
Squamous cell carcinoma	20	57.14

The three tumors found in asses were as follows: (1) sarcoid — thigh; (2) adenoma — eye; (3) fibroma — axillary region.

Tumors of Goats

The different types of tumors and their locations in goats are furnished in table 4.

Tumors of Sheep

Only four neoplasms were received from sheep. The extreme paucity of ovine neoplasms is due to the fact that sheep are reared in this state for mutton and are slaughtered at a young age. Only a few breeding animals are maintained and allowed to grow old. Those reported were as follows: (1) squamous cell carcinoma from the nostril of a two year old ewe; (2) squamous cell carcinoma from the neck of an old animal; (3) hepatocellular carcinoma from an aged ewe; (4) chondroma from the uterus of an ewe.

TABLE 4

Type of Tumor		%	Location and Description of Animal
Fibroma	1	4.8	abdomen and udder of a female.
Fibroid	1	4.8	uterus of a 4 year old female.
Liomyoma	1	4.8	ear of a 4 year female.
Melanosarcoma	1	4.8	perinium of a 2 year old female.
Nasal polyp	1	4.8	nose of a 6 year old female.
Papilloma	7	33.2	mouth, nostril, face, neck and body. (all between 1 and 3 years)
Papillary adenoma	1	4.8	neck of a 2 year old animal.
Adenocarcinoma	1	4.8	vulva of a 6 year old female.
Squamous cell Carcinoma	7	33.2	eye 3; udder 3; vulva 1. (all between 3 & 5 years)
Total	21		

Tumors of Cats

The three tumors received from cats were adenocarcinomata from mammary glands.

Other Observations

During the 12 year period between 1940 and 1951, the following neoplasms recovered from various species were received.

TABLE 5

Animal Species	No. Neoplasms Examined	Percentage
Bovine	2,009	83.7
Canine	325	13.5
Equine	38	1.6
Caprine	21	0.9
Ovine	4	0.2
Feline	3	0.1
Total	2,400	

Summary

An account of neoplasms collected over a period of 12 years at the Madras Veterinary College, India, from among dogs, horses, asses, goats, sheep, and cats is presented. It is observed that in mammals, other than dogs, the neoplasms of the epithelial tissues are encountered most frequently. Among dogs, the venereal tumor is more frequent. Unfortunately, the breed incidence of tumors in dogs could not be given in details.

Acknowledgments

The writer is thankful to late Dr. I. M. Azizzuddin, B.A. G.M.V.C. B.V. Sc., Ph. D (Edin.), former principal of the Madras Veterinary College, for affording facilities to compile this list of neoplasms; and to Dr. M. J. Tweihaus, D.V.M. M.S., professor and head of the Division of Pathology, Kansas State University, for giving this report his helpful criticism.

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Practitioners' observations on new drugs are reported here each month as clinical notes, and do not constitute controlled research.

Clinical Report

Myiasis in a Grizzly Bear

AN ADULT GRIZZLY BEAR at the Rio Grande Zoo, Albuquerque, New Mexico, injured in a fight with another bear, had a raw open wound in the region of the nape. The wound was nearly 6 in. long and 4 in. wide and became infested with hundreds of fly larvae. Although the exact species of larvae was not determined, the infested wound had many of the characteristics of a true screwworm infestation. For lack of adequate equipment to restrain the animal, treatment could not be applied. The condition of the wound became worse, and in an attempt to save the animal, the advice of the local office of the Animal Disease and Parasite Research Division, A.R.S., USDA, was sought. Upon their suggestion, 0.5 pound of 25% wettable Bayer 21/199 (Co-Ral—Chemagro Corp., of Kansas City) was mixed in approximately three gallons of water. The suspension was estimated to be a 0.5% concentration of actual insecticidal ingredient. The infested area was exposed when the bear lowered his head to pick up food thrown to him on the cage floor. While in this position, the operator, standing on top of the cage, applied the suspension by throwing it over the bear, directing it on and around the infested area. The same treatment was applied the following day. Five days after initial treatment, the wound apparently was closed and appeared to be dry. On the tenth post-treatment day, the injured area was covered with a thin new growth of hair.

When Co-Ral is applied to the skin of animals, a portion is absorbed and translocated to all parts of the body by the vascular system. It is particularly well adapted to the treatment of various myiases—infestations of the skin and subcutaneous tissues of animals with larvae of certain species of flies—common in the United States. Practically all mammals are susceptible to attack by these flies. In New Mexico, the most frequently encountered species are *Callitroga macillaria,* the secondary screwworm, and *Callitroga hominovorax* (Coquerel), the true screwworm.

It has been tested experimentally on livestock in all parts of the United States by federal and state officials. It is now registered with the United States Department of Agriculture for use on beef cattle for the control of cattle grubs, lice, flies, and screwworms. For the treatment of cattle grubs, Co-Ral is used as a spray at 0.25 or 0.5% concentration. For the treatment of cattle or sheep with screwworm-infested wounds, it is applied on or near the wound in the same concentrations.

Although the drug has been used safely and effectively for the treatment of external parasites of domestic livestock, no toxicological data are known to exist for its use on zoo animals. The successful treatment of the wounded bear suggests its provisional use for the treatment of other zoo animals, especially carnivores, that frequently hurt one another while fighting and suffer wounds particularly vulnerable to screwworm infestations. — *Ivo Poglayen, Ph. D. and H. O. Peterson, D.V.M.*

Anti-Inflammatory Therapy

J. BRUCE WENGER, D.V.M.
Columbus, Ohio

METHYLPREDNISOLONE (Medrol — Upjohn) is an orally active derivative of prednisolone. In addition to great potency, and hence decreased dose, it has less tendency to produce salt and water retention (edema) and other undesirable side-actions (polydipsia, polyuria).

Skin Conditions

Case 1. A Collie, spayed three years ago, weighing 60 lb., with recurrent generalized neurogenic dermatitis, acute erythema, and intense pruritus, was presented for treatment. Methylprednisolone tablets were administered, 4 mg. b.i.d. for three days, then 2 mg. b.i.d. for seven days. The condition was relieved for an additional three weeks, but subsequently began to recur. It was finally controlled on 2 mg. Medrol administered daily for six weeks. A slight increase in water intake was noted, but no other side-actions were evident. On another recurrence, the condition was controlled on 2 mg. daily for two weeks, then 1 mg. daily for eight weeks.

Case 2. A male Cocker Spaniel, 12 years of age, weighing 24 lb., with generalized pruritus associated with chronic (compensated) interstitial nephritis, was presented at the clinic for treatment. Methylprednisolone tablets were administered, 2 mg. b.i.d. for four days, then 2 mg. daily for seven days. The condition was then successfully controlled on 1 mg. daily. No side-actions were noted.

Case 3. A neutered male cat, eight years of age, weighing 7 lb., with nonspecific dermatitis on the lumbar area, was presented. Methylprednisolone tablets were administered, 1 mg. b.i.d. for two days, then 0.5 mg. daily. The condition was successfully controlled with no side-actions.

Case 4. A male Dachshund, eight years of age, weighing 15 lb., with allergic dermatitis of abdominal and inguinal areas, was presented for treatment. The animal had failed to respond to medicated baths and topical antibacterials. Methylprednisolone tablets were administered, 4 mg. b.i.d., for three days, then 2 mg. b.i.d. for eight days. Complete control with no side-actions followed.

Cases 5,6,7. Adult cats exhibiting generalized fungal dermatitis (*Microsporum canis*) with pustule formation were presented. Topical fungicide was applied. Methylprednisolone tablets, 1 mg., administered daily for ten days gave complete control. No side-actions were evident.

Case 8. A female Collie, nine years of age, weighing 70 lb., with chronic (compensated interstitial nephritis, was presented for treatment. Systemic antibiotics and methylprednisolone tablets, 4 mg. t.i.d. for seven days, were administered. Dramatic improvement was noted in one week. Treatment with 4 mg. b.i.d. for seven days continued, then 4 mg. were administered for ten days. No side-actions were evident.

Case 9. A male cat, four years of age, weighing 8 lb., with resistant chronic otitis externa (micrococcal) was presented. Treatment included flushing of ears, systemic antibiotics, topical antibiotic-corticosteroid ointment, and methylprednisolone tablets administered 2 mg. daily for four days. Excessive sebum was noted at two weeks, but the animal was essentially normal. No side-actions were evident.

Arthritic Conditions

Case 1. A spayed Dachshund, seven years of age, weighing 17 lb., with a previous history of intervertebral disk lesions at L_1, L_2, and L_3, and resulting paraplegia, was presented. New lesions now at T_{10-12} were noted and the animal was again paraplegic. There was no response to intramuscular suspension prednisolone (25 mg. for two days). Methylprednisolone tablets, 4 mg. t.i.d. for two days, were administered; then 4 mg. b.i.d. for three days; and 2 mg. b.i.d. for seven days. At the end of treatment, the dog was asymptomatic. The animal was later maintained successfully on 2 mg. daily. No side-actions were noted.

Case 2. A female Chihuahua, seven years of age, weighing 3 lb., with tonic muscular spasms of both front legs (traumatic?) and myalgia, was presented. Methylprednisolone tablets were administered, 0.5 mg. t.i.d., for one day; 0.5 mg. b.i.d. for three days; then 0.25 mg. daily for four days. Symptoms were controlled. No side-actions were evident.

Case 3. A female Labrador Retriever, ten months of age and weighing 58 lb., with paraplegia, was presented. Methylprednisolone tablets were administered, 4 mg. for 14 days, then 2 mg. daily for 30 days. The condition was generally controlled, but periodic pain and hindleg weakness were evident.

Other Conditions

Case 1. A spayed Bedlington Terrier, eight years of age and weighing 16 lb., with chronic blepharitis, secondary keratitis, and rhinitis of allergic origin, was treated. The condition had been chronic for over six years and associated with bacterial (micrococcal) nasal infection. Systemic antibiotics and methylprednisolone tablets, 2 mg. b.i.d. for seven days, were administered. Blepharitis became improved and rhinitis was soon under control. Topical antibiotic-corticosteroid drops were administered to the eyes; methylprednisolone was administered (2 mg. daily for ten days) at which time improvement in keratitis was noted. When treatment was stopped, rhinitis recurred, but was controlled on 1 mg. daily without side-action.

Case 2. A male Dachshund, three years of age and weighing 24 lb., with acute prostatic infection and associated paraplegia, was treated. Systemic antibiotics, estrogens, and methylprednisolone tablets (2 mg. b.i.d. for three days, then 2 mg. daily) were administered. The condition was thus controlled with no side reactions.

Concluded on page XXXVI

Establish Research Grant

The Research Fellowship of the Illinois State Veterinary Medical Association, the first of its kind to be established by a state veterinary medical association, has been granted for the coming year to Dr. M. L. Kaeberle, instructor in clinical medicine in the University of Illinois College of Veterinary Medicine.

Dr. Kaeberle is an outstanding scholar and a member of honorary scholastic as well as scientific organizations. He has been the recipient of the Borden Award, the Roud McCann Scholarship, a University of South Dakota tuition scholarship and a University of Illinois fellowship.

Approve Veterinary Clinic Building

The Curators of the University of Missouri have approved the architect's preliminary plans and specifications for a new Veterinary Clinic building on the campus. President Elmer Ellis said the architects have been instructed to proceed with final plans and specifications so the University may advertise for construction bids.

The new Veterinary Clinic building was provided by an allotment of $800,000 from the State Building Bond Issue. It will replace the temporary structure now in use which was obtained from government surplus following World War II.

Iowa State College to Acquire Land

Iowa State College will purchase 92.5 acres of land for expansion of its Veterinary Medical Research facilities, under authorization from the State Board of Regents.

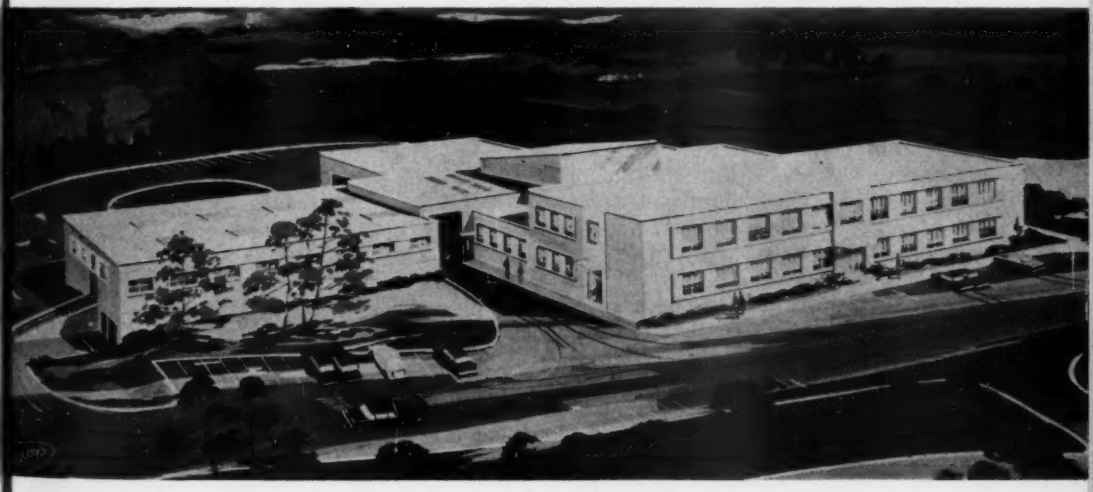
Most of the land, which lies just east of the present Veterinary Medical Research Institute property, and across the road from it, will be used as pasture area for research animals.

Investigations as to the cause, nature and consequence of important animal disease of Iowa livestock will be made. Parasitic infections of cattle, sheep and swine; leptospirosis of cattle and swine; diarrheas of cattle and swine; pneumonia and respiratory tract infections of swine, poultry and cattle represent some of the problems currently being attacked, and which cause large losses to Iowa agriculture.

Purchase of the land will be made for $40,000.

Benger - Fort Dodge Litigation

Benger Laboratories Limited and Fort Dodge Laboratories, Inc., announce that the litigation between them respecting the use of iron dextran for overcoming iron deficiency anemia in hogs has been amicably settled, and Fort Dodge Laboratories, Inc., has taken a license for the sale of this material.



Gaines Veterinary Symposium

Six prominent researchers and scientists will participate in the ninth annual veterinary symposium on "The Newer Knowledge About Dogs," to be held on Wednesday, October 14, at the Kankakee, Illinois, Civic Auditorium, under the auspices of the Gaines Dog Research Center, New York.

Dr. C. A. Brandly, dean of the University of Illinois School of Veterinary Medicine, will again serve as chairman of the program, which will include these speakers and subjects: Dr. William Ivens Jr., Doylestown, Pennsylvania, "Breeding for a Purpose"; Dr. Eugene Hartley, New York University, "Man and Dog — Psychological Analysis"; Dr. Howard A. Schneider, Rockefeller Institute for Medical Research, "Genetic and Nutritional Determinants of Disease"; Dr. Douglas Robson, Cornell University, "Statistical Studies of Distemper in Dogs"; Dr. Frank A. Hayes, University of Georgia School of Veterinary Medicine, "Canine Ascarids"; and Dr. George W. Eberhardt, Veterinary School, Kansas State College, "Epilepsy in the Dog."

Divine To Squibb Post

Thomas H. Divine, special Squibb veterinary representative in the Kansas City sales region, has been appointed assistant manager, veterinary department in the firm's New York headquarters.

A graduate of Oklahoma A & M with a B. S. degreee in animal husbandry, he went into sales in the pharmaceutical industry at the end of World War II and came to Squibb in 1957.

Pfizer Names Veterinary Director

Dr. Simon J. Kalish has been appointed associate veterinary medical director of Pfizer Laboratories. In his new position, Doctor Kalish will be engaged in clinical evaluation of new products, professional relations with veterinarians and the development of medical communications technics.

Grant-in-Aid to Washington

The College of Veterinary Medicine at Washington State College has accepted a grant-in-aid from American Cyanamid Company's Agricultural Division for the study of virus diseases in cats.

According to Dr. R. L. Ott, chairman of the department of clinical medicine and surgery at Washington State, such studies on cats are becoming increasingly important because of the large number of feline patients in small animal practice.

To Inspection Branch Post

Dr. William F. Dossey (Texas A & M, 1952), who has been Assistant Head, Facilities Section, Inspection Branch, Poultry Division, Washington, D. C. since November 1957, has been transferred to the Chicago area office of the Inspection Branch as Area Technical Supervisor.

Archibald Receives "Fido" Award

Dr. James Archibald (right), head of the division of small animal medicine and surgery of Ontario (Canada) Veterinary College, receives his "Fido" as Veterinarian of the Year from Harry Miller, director of the Gaines Dog Research Center, at opening session of the American Animal Hospital Association convention, Colorado Springs. At left is Dr. C. W. Bower, chairman of the A.A.H.A. Awards Committee, who announced the selection.

Tactful collection of overdue bills is a continuing problem in veterinary practice. Here the writer outlines some of the basic points a practitioner should consider before placing overdue accounts into the hands of a collection agency.

A Veterinarian's Use of the Collection Agency

ERNEST W. FAIR

Boulder, Colorado

SOME OF THE SADDEST EXPERIENCES of veterinarians have arisen out of the procedures followed in collecting long overdue bills, and most of these arose from selection of the wrong collection agency.

The right agency can handle a doctor's overdue bills with not only positive collection results but without damaging his prestige. The wrong one may exact some collections but at a cost beyond what the veterinarian should be willing to pay.

There are a number of time-tested and proved factors every veterinarian can adhere to with good judgment. Here is a summary of the more important of these.

First, think twice before you (1) give up personally on collection, and (2) select the collection agency to do the job. In many instances a single additional reminder from one's office can secure payment on the long overdue bill. Making certain that one has tried every possible alternative toward securing a settlement on the account should be a must.

The Right Agency

After that point has been reached, the big question of picking the right agency arises. To the reader who has not used an agency before it is never good procedure to call in the first that one runs across. To the doctor who has used such service in the past it may still be a wise procedure to consider other agencies available. In either case here are the points which should be considered, investigated and analyzed before any reader selects a collection agency to handle his stack of overdue accounts.

1. Give preference to the old and experienced agency; it has its own reputation and its own business to protect and is much more apt to handle collections wisely than an inexperienced agency or telephone booth operator working out of a home or as a sideline.

2. The wrong type of agency or individual can do a great deal of harm to a practice. If there is such a firm in your community or area which has specialized in collecting professional accounts, that firm has a decided edge over others.

3. Consider, too, whether or not the agency has the experience to collect from the type of accounts which make it a practice to defer payment of all such professional bills, for you will have a lot of them on the list. This sometimes takes a special technic and procedure.

4. Next, be careful of what rights in the account you sign over to the collection

agency. If a contract is presented, read the fine print carefully. If none is offered, insist on a letter of agreement. Reserve the right to withdraw the account if you can; something may turn up that will be to your advantage to put off a collection effort on an individual account and the agency may be reluctant to discontinue its efforts.

5. Check carefully on who retains the right to decide whether or not legal action will be taken in effecting a collection. This decision should always be reserved by the veterinarian to himself since in many cases such action will cause far more damage to a reputation than obtaining results would be worth. It also pays to reserve the right to determine what particular action of any kind will be taken by the agency on individual accounts; that too may be valuable in specific exceptions.

6. Withhold the right of the agency to "lump" your account with those of a number of other clients in a single collection effort. There are cases where this can be advisable from one's viewpoint and others where it will be inadvisable. Reserve the right to pass judgment on each case yourself.

7. Make certain also that all fees involved in the collection agency's handling of each account are clearly understood beforehand. Where additional legal or court action may be required, make certain who is to pay the expenses.

8. It is also advisable to have an understanding with regard to the time limit involved for securing positive action. The amount of continued pressure the agency guarantees to apply if initial efforts fail should be agreed upon in advance.

9. It is important to get acquainted with the agency employees who handle professional accounts. One should never forget that such individuals will be representing the professional man personally when the collection effort is made. A man of the wrong type may cause so much damage that collection of a single account will never offset the ill-will created.

10. Another wise step is to demand, see and read the forms and collection letters used by the agency under consideration. Some of these can be pretty "raw." Some may not even fit collection of your bill. It's a good rule to never authorize the use of any such form or letter that you would not sign personally if you were sending them out.

The Agency Reputation

In addition to the ten rules cited above, it is well to ask for the names of other professional men who have used the particular collection agency in the past and take the time and trouble to actually talk to these men and find out about their own experiences with that particular agency. Not only can one obtain a good idea of the effectiveness of a given agency in this manner, the procedures they use, etc., but one may also obtain some valuable warnings on what to do in dealing with other agencies.

Checking on whether or not a particular collection agency is affiliated with others in nearby cities and towns may also be good procedure since invariably a number of such past-due accounts will be move-aways. The agency that has such affiliation is of more value than the one which does not. Investigate, also, whether or not there are any additional charges involved should the assistance of such an out-of-town affiliate be required.

It also pays to make certain where one stands with reference to possible legal counter-action which may arise as the results of agency activities in handling a collection. Some agencies take over all responsibilities; others assume nothing. It might be a good point to check locally with your lawyer; state laws vary to the extent that no general rule can be applied.

Be sure the amount due is correct before you turn over the account for collection by the agency. Mistakes of this nature are always a source of unpleasantness.

The Time Element

Do not wait too long before turning accounts over to the agency for collection. Set up a continuing procedure rather than letting some become so old that they are almost uncollectable. No reliable collection agency likes to work with any business or professional man who turns over to them only "the impossibles."

Finally, before any collection agency is handed the account, try again.

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Dermatoses	5 mg./10 pounds body weight, total single dose not to exceed 20 mg. For sustained therapy, repeat once or twice a week as indicated.
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*This initial injection may be reduced to 50 to 100 mg. intramuscularly if simultaneous administration of intravenous glucose is given, thus permitting more economical glucocorticoid therapy. If necessary, either regimen may be augmented by an additional injection of 50 to 100 mg. Ultracortenol after 24 to 48 hours. IMPORTANT: Milk from treated cows should be discarded or used for purposes other than human consumption for at least 24 hours after the last treatment.

SUPPLIED: **Multiple-dose Vials,** 10 ml., each ml. containing 10 mg. or 25 mg. of prednisolone trimethylacetate in suspension for injection.

ULTRACORTENOL is available from ethical veterinary distributors throughout the United States.

References: 1. Vigue, R. F.: J.A.V.M.A. 133:326 (Sept. 15) 1958. 2. Shaw, J. C.: Personal communication. 3. Pollock, S.: Vet. Med. 54:97 (Feb.) 1959. 4. Rabin, P. H.: Personal communication. 5. Hoffer, S. H.: Personal communication. 6. Weir, H. T., and Hazelrig, J. W.: Personal communication. 7. Beck, J. W.: Personal communication. 8. Bull, W. S.: Personal communication. 9. Fessenden, P. E.: Personal communication. 10. Lohmeyer, C.: Personal communication.

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INFLAMMATORY CONDITIONS

Concluded from page 432

Summary

Fourteen patients, nine dogs and five cats, with inflammatory conditions of the skin, musculoskeletal system, or other tissues, have been treated and controlled on minimal doses of methylprednisolone (Medrol). Side-actions were minimal or absent.

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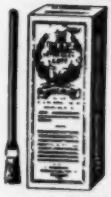

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INDICATIONS: An iron dextran injectable for the prevention of anemia in newly-farrowed pigs.

ADMINISTRATION: Administer intramuscularly

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PACKAGING: Elfaro-Dex is packaged in 10, 25, and 50 dose vials.

Elfaro-Dex is

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new iron dextran injectable produced to overcome the lack of iron in newborn pigs. For pigs farrowed during any season, an Elfaro-Dex injection on the first to the fourth day keeps sucklings fully protected against anemia for the all-important first 4 weeks. The baby pig utilizes feed better, becomes more thrifty, steps-up weight gains, and is ready for market sooner. Resistance to scours, T.G.E., and other infections is greatly increased.

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A practical, low cost line of **Disposable Clothing** that is soft, light weight and comfortable is available to institutions and the profession. Fire resistant and water repellent, disposable clothing can be worn over street clothes or as out garments. They are lint free and can be autoclaved. For complete details write General Scientific Equipment Company, 7516 Limekiln Pike, Philadelphia 50, Pennsylvania.

A new **Fibrin-Dissolving Enzyme** combined with certain antibiotics has been used successfully in controlling the development and spread of resistant bacteria frequently found in hospitals. The enzyme promotes healing through rapid removal of pus on the surface resulting from wounds, burns, ulcers, and non-healing incisions. The enzyme fibrinuclease (Elase—Parke, Davis) is not now commercially available.

An **Improved Rabies Vaccine** giving long-lasting immunization for dogs and cats is being made available to veterinarians by American Cyanamid. The new vaccine is a centrifuged product containing a modified live virus of chick embryo origin in 40% suspension. Changes over the previous product permit a reduction in dosage from 3 cc. to 2 cc.

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series are less than three inches high and are finished in brushed chrome and charcoal gray. For information ask Talk-A-Phone Company, 1512 S. Pulaski, Chicago 23, Illinois.

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make a self-contained unit. A snugly fitting friction cap keeps contents damp and free from chemical change. After use it may be incinerated. Samples are available from Busse Plastics, 64 E. Eighth Street, New York, New York.

A loose-leaf **X-Ray Department Planning Book** covering installations for every phase of *x*-ray and radioisotope applications has been published. Each section includes layouts, wiring diagrams, electrical specification and construction details. For information contact Picker *X*-Ray Corporation, 25 South Broadway, White Plains, New York.

Lasticolor is a new product that can be sprayed on soiled chairs to recondition fabrics. The spray can also be applied successfully on a wide variety of materials, including plastics, leather and natural and synthetic fibers. It does not change the texture of the material, but adds water repellency and retards soiling. Anyone capable of using an ordinary spray gun can make a top quality application which dries in less than 15 minutes. The product permits application in a practitioner's office without disturbance of the regular routine. For details ask Taussig Paint Sales Company, Old York Road and Township Line, Jenkintown, Pennsylvania.

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Co-Ral in a "pocket sized livestock duster" is easy to carry and apply, and controls screwworms and ear ticks when applied as spot treatment for 20 days. For details on price and packaging, write Evans Orchard Supply Company, 301 Delaware Street, Kansas City 5, Missouri.

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A Deferred Payment Plan has been instituted by Syrall Manufacturing Company, thus making it a simple arrangement for all practitioners to buy the Samco Gas Fired Crematory Industrial Destructors. These units are designed to cremate animal carcasses, cage papers, feces, and all wet or dry combustibles. The manufacturer feels that there are numerous veterinarians in small animal hospitals being established by young graduates and others who are not immediately in a position to qualify for purchase on the firm's existing Purchase Agreement Program. A one year guarantee on all burner assemblies furnished with Samco gas fired destructors has also been announced. Since there are no mechanical parts, a further warranty has been established against burn-out of the casing under normal use. The six capacity units of this equipment have engineered updraft design for either natural, L-P bottled or manufactured gases. The front door and raising top has been improved by addition of cast iron liner plates. For details write Syrall Manufacturing Co., 511 North State Street, Syracuse, New York.

A portable **Incubator for Antibiotic Sensitivity Testing** that will incubate up to eight Petri dishes at one time, yet weighs only 12 pounds, stands only 12 x 12 x 12 in. is now available to the profession. The new unit operates on 110 volt, AC-DC current. The door of the unit has a glass window for easy observation. For more information, write Haver-Lockhart Laboratories, 800 Woodswether Road, Kansas City, Missouri.

Globulon designates a purified solution of canine beta and gamma globulins, the antibody containing fractions of blood, and can be used to give protection against the common infections, distemper, hepatitis, and leptospirosis. Extensive clinical investigations indicate that Globulon is effective in the treatment of a wide variety of infectious conditions, and has a synergistic effect when used in combination with antibiotics, sulfonamides and other therapeutic agents. For details check with Pitman-Moore Company, Indianapolis, Indiana.

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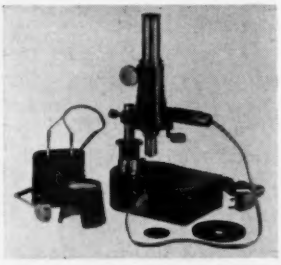
A line of 15 **Precision Microscopes** priced to appeal to beginners as well as experts is now being marketed. Finished in a distinctive pastel gray, selected for its capability of maintaining a clean, fresh look even after



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REFERENCES: 1. Pollock, S.: Control of Nonspecific and Specific Enteritis in the Dog; read at the First Regional Conference on the Nitrofurans in Veterinary Medicine, Wilmington, Delaware (June 5, 1958). 2. Fisher, G. W.: Oral Use of Furadex in Canine Diarrhea, N. A. Vet. 39:133-134 (Mar. 15) 1958.

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Veterinary Division

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Treatment of Oestrus ovis

In the article, treatment of Oestrus ovis with Dimethoate, which appeared in the July issue of VETERINARY MEDICINE (54:377, 1959), an error was made in the carry-over from page 380 to 382. The entire sentence should read: "Toxic symptoms developed in six of the eight treated animals (equally divided as to groups), and one animal died in 49 hours."

North Carolina Group Meets

At the last meeting of the Eastern North Carolina Veterinary Medical Association, which was held May 26 at the Charcoal Steakhouse in Raleigh, North Carolina, the following were elected officers for the coming year: Dr. W. A. Potts, Mt. Olive, president; Dr. C. B. Randall, Kinston, vice-president; and Dr. B. H. Brow, Goldsboro, was re-elected secretary-treasurer.

This Association meets the last Tuesday night in each month at a time and place specified monthly.

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Fish and Seafood Products

In most European countries the control of fish and seafood products is regulated in the same manner as meat and meat by-products and supervised by specialized veterinarians. In the United States such control is not existing or is limited to shellfish sanitation, by agencies beyond the veterinary capacities.

Fish and by-products being food of animal origins constitute a potential hazard to public health of veterinary concern.

The most important factors to be evaluated in any attempt at successful control on fish should be based on the following factors:

1. Fish, upon capture are usually left to die rather than be killed and eviscerated and sanitized in the same manner as other domestic animals.

2. Fish saprophytic bacteria, live and multiply at lower temperatures than the mesophilic type.

3. Fish deterioration rate is high and fast even in best preservative conditions, and its incipient putrefaction can be easily disguised by different methods.

4. Fish, as any other living being, is subject to diseases and parasites from which a potential hazard to human health should be considered.

5. Many fish are carriers of physiological poisons with inevitable consequences to man.

6. Freshness of fish can be lengthened by use of antibiotics. Uncontrolled use of them may result in longer preservation but with danger to human health.

7. Handling and processing of this product in the market may result in heavy contamination. Specially designed facilities should be required to reduce such a possibility.

8. Scaled and cleaned fish must be regarded as any other ready-to-cook product, being packaged and preserved, but at a lower temperature.—*The American-Italian Veterinary Bulletin*, January-February 1959.

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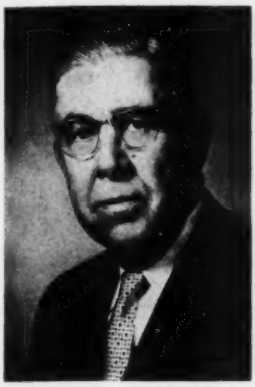
Hendershott to Retire

The retirement of Dr. R. A. Hendershott, Trenton, who has served as director of the Division of Animal Industry, New Jersey Department of Agriculture, for the past 23 years, was announced recently. He had been a member of the department staff since 1926.



Dr. R. A. Hendershott

Doctor Hendershott is well known throughout New Jersey for his work in animal disease eradication, particularly tuberculosis and brucellosis of cattle. During his years as division director, both of these diseases, considered the two most serious affecting cattle, were brought under control in New Jersey.

Doctor Hendershott joined the staff of the Department of Agriculture in 1926 as head of the newly established Bureau of Animal Industry laboratory. He served in this capacity for ten years, when he was named division director.

He is past president of the Veterinary Medical Association of New Jersey, and has served as vice president and secretary-treasurer of the United States Livestock Sanitary Association. He is a member of the American Veterinary Medical Association. He was recently cited by the Co-operative Inter-Breed Cattle Association of New Jersey for his many years of service to the livestock industry of the State.

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REFERENCES: 1. Vickers, C. L.: Personal communication. 2. Filion, R., and Trepanier, M.: Personal communication. 3. Lannek, N., and Brag, S.: Vet. Med. 49:75-78 (Feb.) 1954. 4. Felgate, C. A., and Swann, H. C.: Vet. Rec. 68:259-262 (May 5) 1956. 5. Guthrie, J. E.: Vet Med. 47:307-314 (Aug.) 1952. 6. Guthrie, J. E.: Personal communication.

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These FURACIN products contain FURACIN 0.2% in water-miscible vehicles. Therefore, they may be left in wounds to be sutured.

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This anhydrous, water-soluble dosage form of FURACIN affords prompt relief of otic infections in small animals.

In canine otitis externa, poor drainage, plus the trauma of scratching and rubbing, often frustrates therapy. It is noteworthy that "FURACIN has been used successfully in this condition . . ."*

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*Belloff, G. B.: Calif. Vet. 9:16 (Nov.-Dec.) 1956.

NITROFURANS — a *new* class of antimicrobials—neither antibiotics nor sulfonamides

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Evidence is accumulating that as the control of cattle brucellosis is progressing favorably there is a corresponding decrease in number of human Brucella infections. During 1950 to 1956, although there was an increase in cattle population in Minnesota, there were fewer human cases.

Treatment for Urinary Calculi

Depropanex (Sharp & Dohme) designates a protein free nitrogenous extract of mammalian pancreas that has proved effective in treatment of urinary calculi in cattle. Depropanex tends to produce a local, permanent but prompt relaxation of the ureters.

Tonken, who reports in the *Canadian Journal of Comparative Medicine and Veterinary Science* in October 1958, treated 100 animals with urinary calculi. In one feedlot, 60 steers were exhibiting signs of urinary calculi such as dribbling, blood tinged urine. After three injections of Depropanex, the animals regained normal renal activity within one week.

In other cases reported, a yearling steer, two six month old steers and a two year old Angus bull all yielded dramatic improvement after administration of Depropanex, although surgery was indicated in one case. Rupture of the urethra occurred in a two year old bull undergoing treatment. Castration was then performed. General results were good.

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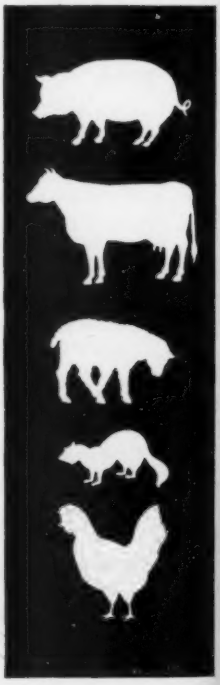

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Immunity to Coccidiosis

Immunity to coccidiosis can be achieved through oral immunization and infection control.

Key ingredient is a liquid vaccine (Coccivac — Nutrena) discovered and developed by Dr. S. A. Edgar, professor and poultry pathologist at Alabama Polytechnic Institute's agricultural experiment station at Auburn. A single dose of the vaccine—which contains live oocysts—is fed in the chicks' water when they are three days old. A series of mild, hardly discernible infections are started that gradually create immunity.

To protect the chick against a full-fledged attack during the immunization period, when it may be exposed to an outside infection as well as to that caused by the vaccine, a coccidiostat (Trithiadol — Nutrena) is included in starter feeds.

Soybean Meal for Swine

The University of Illinois reports that soybean meal as compared with fish meal, or meat and bone scraps, when fed to swine weighing less than 100 lb. resulted in the best gains. Their report indicates that when pigs were getting soybean meal as the only source of protein, they gained more than one pound a day, whereas those receiving fish meal protein only gained three quarters of a pound daily; the ratio between soybean meal and meat and bone scraps was quite similar. Soybean meal is the cheapest of the three proteins. The belief that good swine rations must have animal proteins is apparently not well founded. — *R. R. Dykstra, D.V.M.*

Preserving Meat

It is of interest to note that in Switzerland putrefaction of the deeper parts of beef is controlled by adrenalin injection—to mobilize carbohydrates—an hour or two before slaughter. Spoilage of the surface of meats is handled by ultra-violet radiation. By these steps the development of off-flavors due to spoilage is delayed.—*R. R. Dykstra, D.V.M.*

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In canine tracheobronchitis, FURADANTIN given for 5 days stopped the coughing in 95% of 75 cases; in some dogs, complete symptomatic relief was gained in 48 hours.[3]

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Each FURADANTIN ORA-BOLS provides FURADANTIN 50 mg. in an excipient containing dextrose.

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REFERENCES: 1. Mosier, J. E., and Coles, E. H.: Vet. Med. 53:649 (Dec.) 1958. 2. Belloff, G. B.: Calif. Vet. 9:27 (Sept.-Oct.) 1956. 3. Mosier, J. E.: Vet. Med. 52:445 (Sept.) 1957.

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When body fluid losses and debilitating conditions complicate diseases or infections, prompt, "In Kind" fluid replacement offers the best possible supportive therapy. ■ Just as blood losses should be matched by replacement with blood, and plasma losses by plasma replacement . . . so should gastric and duodenal fluid losses be replaced with balanced, "In Kind" electrolyte solutions. ■ A complete line of highest quality, highest purity "In Kind" parenteral solutions is available to the veterinarian through the Veterinary Department of Abbott Laboratories. ■ These—and many other parenteral solutions—are available from the Veterinary Department, Abbott Laboratories, North Chicago, Illinois; your Abbott representative or your distributor.

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There is a variety of reasons why so many experts in animal nutrition recommend Puss 'n Boots cat food, but the major one is that Puss 'n Boots contains not just one, but a *blend* of healthful ingredients.

Like a balanced meal for human consumption, each ingredient in Puss 'n Boots contributes its special benefit to the overall vitality and handsomeness of a well fed cat.

In itself, whole fish provides a natural storehouse of vitamins, minerals, and proteins. But the makers of Puss 'n Boots, on the advice of animal nutritionists, have also added selected cereals. And on top of *that* extra quantities of Vitamins B_1 and E.

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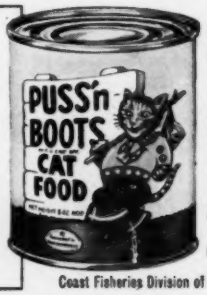

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Tapeworms of Dogs

An authority states that in dogs there are three general types of tapeworms, *i.e.*, (1) the broad fish tapeworm acquired by eating raw parasitized fish; (2) the type of tapeworm, most common in farm dogs, that is acquired by consuming raw meat and viscera; (3) the flea tapeworm for which fleas and biting lice serve as intermediate hosts. Since most dogs are infested with fleas and biting lice the flea tape — a medium sized tape with a very small head and a slender neck—is the most widely distributed of all dog tapeworms. It is also the most difficult to remove, because the slender neck breaks easily, leaving the small head embedded in the wall of the intestine so that a new worm is generated in less than a month. The drugs used for attempted removal of tapeworms are similar for all types.—*R. R. Dykstra, D.V.M.*

Awards Presented at Conference

A highlight of the 21st annual Kansas State University conference for Kansas veterinarians May 31 to June was the presentation of Distinguished Service Awards to two outstanding alumni of the K-State School of Veterinary Medicine. The awards went to Dr. N. D. Harwood, Manhattan veterinarian and businessman, and to Dr. Theodore S. Williams, dean of the School of Veterinary Medicine at Tuskegee Institute. Shown here at the presentation ceremony are, from left, Dr. E. E. Leasure, dean of the K-State veterinary school; Mrs. Harwood; Dr. Harwood; James A. McCain, president of Kansas State University; Mrs. Williams; Lloyd Williams; and Dr. Williams.

Colostrum Boosts Gains in Calves

The colostrum produced a few days after the cow freshens is essential to giving newborn calves a good start, according to Dr. I. W. Slater, University of Wyoming extension dairyman. Needed vitamins and minerals are provided by colostrum. The calf is also protected from certain disease conditions during the first few weeks when fed colostrum.

Ohio State University researchers have found that by feeding all colostrum to older calves in place of salable milk, milk sales were increased by 4,000 pounds in one year.

Colostrum may be fed straight or mixed with other milk.

Parakeratosis of Swine

Parakeratosis of swine, according to recent research activities, may be measurably ascribed to a combination of several factors. First, the water supply for weaned pigs should be readily available and also their feed should be in the nature of wet mashes for at least one month so that the pigs may become fully accustomed to the changed ration following weaning.

Since it has already been established that a deficiency of zinc is a cause of parakeratosis, zinc being both preventive and curative, it may well be that this element, in the absence of adequate fluid intake, is not absorbed sufficiently to meet the animal's requirement, or to maintain the proper zinc-calcium nutritional balance.

A high protein level is usually brought to a lower feed concentration by pasturing the animals, or by the addition of bran, silage, alfalfa and comparable roughages in the diet, and this appears to be desirable.—*R. R. Dykstra, D.V.M.*

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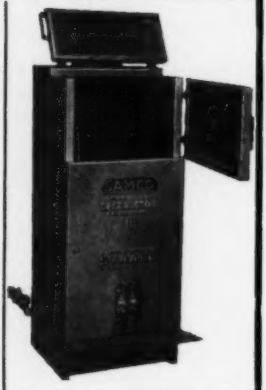

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Research Reveals Highly Effective Anthelmintic for Cattle

The results of recently intensive clinical research revealed an anthelmintic that is highly effective in cattle. Individual animals were confined in special stalls and administered different phenothiazine drench formulations for testing. All urinary and fecal excreta were recovered and each excretion was individually analyzed chemically to determine how much of the dose went into the digestive tract and amount of the dose available for killing worms. Dosages were given on an identical basis.

Greater Concentration

Results obtained from the modified formulation were better than that of unmodified drenches generally used. Tests show that modified formulations made with Purified phenothiazine, micronized for maximum efficiency, produced 6 to 8 times more phenothiazine in the digestive tract in a shorter period of time than other drenches. Peak percentages of the purified chemical were obtained in 17 hours post treatment. The unmodified formulations returned a peak percentage of less than .2% 40 hours or later post treatment.

Other effective products are Pro-Brand Kabtin, a non-toxic demulcent for control of diarrhea from dietary or simple digestive causes; Pro-Brand KZ, antiseptic fungicide for ringworms and mycotic dermatoses; Pro-Brand Chap-Et a protective ointment for udders to reduce swelling and soreness. For details write to Pro-Brand Products Company, P. O. Box 4186, Fort Worth, Texas.

Veterinary Calendar

Jul. 19-22. **Alabama Polytechnic Institute,** 52nd annual conference for veterinarians. School of Veterinary Medicine, Auburn, Alabama. (Housing facilities will be available for married couples.) Dr. J. E. Greene, A.P.I., Auburn, Alabama, dean.

Jul. 20-22. **Canadian Veterinary Medical Association,** annual convention. Ontario Veterinary College, Guelph, Ontario, Canada. Dr. H. J. Neely, Ontario Veterinary College, Guelph, Ontario, chairman.

Jul. 26-28. **Arkansas Veterinary Practitioner's Association,** annual meeting. Mather Lodge, Petit Jean State Park, Morrilton, Arkansas. Dr. W. H. Babbitt, 204 East 13th Street, North Little Rock, Arkansas.

Jul. 26-29. **Mississippi State Veterinary Medical Association,** annual meeting. Buena Vista Hotel, Biloxi, Mississippi. Dr. J. W. Branson, Jackson, Mississippi, secretary-treasurer.

Aug. 23-27. **American Veterinary Medical Association,** 96th annual meeting in conjunction with **Third Pan American Congress of Veterinary Medicine.** Municipal Auditorium, Kansas City, Missouri. Dr. H. E. Kingman Jr., 600 S. Michigan Avenue, Chicago, Illinois, executive-secretary.

Sep. 3-4. **Colorado Veterinary Medical Association,** annual meeting. Shirley Savoy Hotel, Denver. Dr. Gail H. Gilbert, 5500 Wadsworth Avenue, Arvada, Colorado.

Sept. 10-11. **Midwestern Interprofessional Conference on Diseases of Animals Transmissible to Man,** 2nd annual meeting. State University of Iowa, Iowa City, Iowa. Dr. R. A. Tjalma and Dr. Ian Maclean Smith, co-chairmen of the 1959 Conference.

Sep. 21-22. **New Mexico Veterinary Medical Association,** annual meeting. Western Skies Hotel, Albuquerque, New Mexico. Dr. E. R. Leslie, Carlsbad, New Mexico, secretary.

Oct. 7-9. **Purdue University, Conference for Veterinarians.** Purdue University, Lafayette, Indiana. Dr. L. M. Hutchings, chairman, Conference Committee.

Oct. 15-16. **Eastern Iowa Veterinary Association,** 46th annual meeting. Hotel Roosevelt, Cedar Rapids, Iowa. Dr. Charles B. Thayer, Iowa City, Iowa, secretary.

Oct. 29-31. **Animal Care Panel,** annual convention. Sheraton Park Hotel, Washington, D. C. Dr. William I. Gay, 2101 Constitution Avenue, N.W., Washington 25, D. C., chairman.

Nov. 2-3. **University of Missouri,** 35th annual veterinary conference. School of Veterinary Medicine, Columbia, Missouri. Dr. Cecil Elder, chairman.

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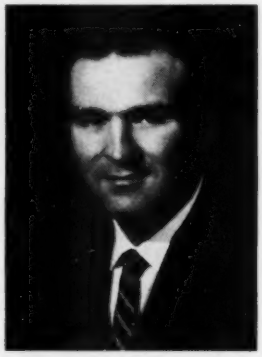
Rosenberger Joins Armour

James H. Rosenberger, D.V.M., has joined the Veterinary Technical Department of the Armour Pharmaceutical Company as assistant director.



Dr. James H. Rosenberger

Dr. Rosenberger is a graduate of Ohio State University. He entered private partnership practice after graduation and located in Clinton, Wisconsin, where he conducted an extensive general veterinary practice until his new appointment.

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DIZAN Powder contains the new vermifuge, dithiazanine iodide, in a nutritive carrier palatable to dogs. It offers ease and flexibility of medication in hospitals, kennels, and for individual pets because it is designed for mixing into a dog's regular ration as a variable treatment course. DIZAN Powder is supplied in 150 and 650 gram bottles with plastic measuring spoons.

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